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Barriers to knowledge sharing and utilisation in global project teams: A case study of ERP knowledge in ExxonMobil

by

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A Dissertation presented in part consideration of the degree of
Master of Business Administration

To My Family

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No words can express my gratitude. Thank you, thank you!

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Executive Summary

Is knowledge management a buzz word, a management *couture* that grace publications headlines? Was it the star of the next big thing?

This paper does not aim to answer the question or to predict the next big thing. It takes a simpler view of researching a pool of people on the influence of knowledge management in their daily work lives. The selected company is ExxonMobil, a petrochemical giant. It first goes into some definition of knowledge management and information. Then, it briefly touched on the phases of knowledge management evolution. After that, it meanders into a few selective works of academics and tries to understand the influence from the consultancy world.

The paper takes inspiration from Nonaka and Takeuchi, Thomas H. Davenport and Yogesh Malhotra. Some of the theories were dwelled into. Perhaps the most referred to model came from Nonaka and Takuechi – the knowledge spiral. It explains how tacit and explicit knowledge are converted that spun a continuous web of learning and acquiring knowledge and how such knowledge etched on people's mind.

Out of curiosity, the author tries to research on the effect of knowledge management on a particular group of employees. With virtual teams and globalisation as the daily work norm, the pool of candidates was taken from around the world. Questions were asked, answers were given. Is knowledge management just a lingo to generate work for the upper echelons or was it a process put in place to ensure business continuity? At least, the management is acknowledging it instead of not doing something about it.

Conclusions were drawn from the research. Limitations though inevitable, were acknowledged. Ideas for future research spawned from the initial research were put across.

This paper tries to make sense of Knowledge Management. But mostly, it is trying to understand people. People – the knowledge creators and how they left an imprint on the organisation.

1 Project Objective

The research question is, "Barriers to knowledge sharing and utilisation in global project teams: A case study of ERP knowledge in ExxonMobil." The objective of this research is to understand the use of knowledge management in ExxonMobil, particularly in the Information Technology division. The paper also measures how successfully the company utilises knowledge management, especially with the globalisation and formation of virtual teams in the Information Technology division.

The paper draws it resources from several knowledge management academics, such as Nonaka, Davenport and Malhotra. It also looks at the way knowledge management is utilised in ExxonMobil.

1.1 Scope of Dissertation

The research will focus on the Information Technology (IT) in ExxonMobil. Instead of dwelling into the types of IT architecture, applications or products, the research will focus on the process.

Within IT, the research will narrow down to the ERP (SAP) group. This group was selected for its daily business dealings with worldwide customers (internal). Within SAP, a sub-division called the SAP Basis will be researched upon.

1.2 Methodology

Twenty four participants were randomly selected from a list of about 200 employees working within the SAP Basis sub-group. Out of this, twenty agreed to be interviewed. These twenty participants are located in different countries, with a third from Asia Pacific, Europe and America (North and South America).

The interview was conducted either face-to-face (geographical permitting) or through telephone conversations as well as Instant Messaging. English language was used as the medium of exchange.

Many of the respondents agreed that human interaction is important for transferring or sharing of information. This is even more so due to the complexity of working in a virtual team organisation. They also agreed that it is not easy to retain experienced knowledge (tacit) workers. Although the company has provided a formal method and framework to retain and/or disseminate information, but informal ways of transmitting information is considered superior. Informality means that the person feels comfortable walking across to another person's cubicle asking questions, or through using the telephone or by utilising instant messaging to ask questions across the globe.

2 What is Knowledge Management

Knowledge Management (KM) was a buzz phrase for creating and sharing know-how that began many years ago. Drucker (1988) said that the typical business of 2000s will have half the levels of management and one-third the managers of its counterpart in 1980s. Work will be performed by specialists brought together in the task forces that cut across traditional departments. These organisations demand knowledgeable users who can transform their data into information.

Today, this hot item in the 1990s has watered down KM's popularity as a category. To many third-party vendors, KM became "whatever I want and can sell to you", be it new software application for items tracking, warehousing ideas on cost cutting, building secure web pages for global enablement, reinforcing innovation or re-focusing on intellectual capital. Therefore, KM can be and mean anything under the sun. First, let us try to define KM. To understand KM, we need to know what defines knowledge and within knowledge, what is information.

2.1 Definitions of KM

One of the best places for management definition apart from dictionaries and management *gurus* is the discussion forum where people meet (virtually) to discuss and exchange ideas. In the Knowledge Management Forum, Newman (2002) mentioned that KM is a collection of processes that govern the creation, dissemination, and utilisation of knowledge that has been around for a long time. Some of the practitioners are philosophers, priests, teachers, politicians, scribes and Liberians. He stated that KM is not a "computer thing" or a "technology thing". Rather, it is the entire process of discovery and creation of knowledge, dissemination of knowledge and utilisation of knowledge.

While Newman's view on KM is on the general side of KM, R. Gregory Wenig in the KM forum provided his views on KM for the organisation. According to Wenig, KM used by organisation consists of activities focused on the organisation gaining knowledge from its own experience and from the experience of others. It uses the knowledge gained to fulfil the mission of the organisation. The applications of KM are used by combining existing knowledge, technology, organisational structures and management strategies to produce new knowledge. The knowledge is used as an enhancement to acquiring, storing and utilising knowledge for learning, problem solving and decision making.

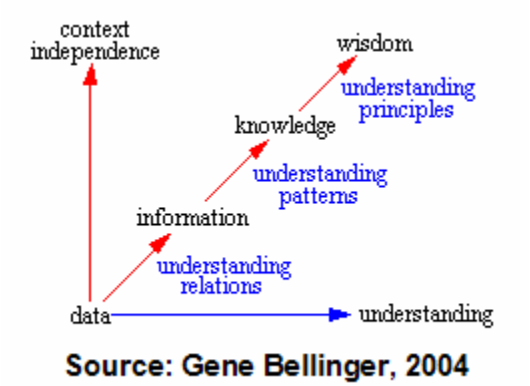
From the KM forum I realised that there is more then one dimension to the definition of KM. Malhotra (2000) summed it up by proposing a more acceptable working definition of KM to be, "Knowledge Management caters to the critical issues of organisational adaptation, survival, and competence in face of increasingly discontinuous environmental change. It embodies organisational processes that seek synergistic combination of data and information processing capacity of information technologies, and the creative and innovative capacity of human beings." In short, KM can be termed as the management of knowledge within organisations.

2.2 What is knowledge?

The above were some of the views from the KM forum archive (Newman, 2002). But what exactly is knowledge? Niel Fleming as stated in Bellinger's (2004) paper made the following observation:

- A collection of data is not information.
- A collection of information is not knowledge.
- A collection of knowledge is not wisdom.
- A collection of wisdom is not truth.

I believe Fleming is trying to put across that information, knowledge and wisdom are more then mere collection of data. The three intertwine and adds up to a new form of synergy.



Source: Gene Bellinger, 2004

Based on the graph on the left, it all started with data. Data has two axis, context independence and understanding. We assume that information, knowledge and wisdom have linear relationship depending on the context and understanding.

If the data (letter, word, and sentence) is "out of context" we cannot derive any meaning from the data. Without understanding of data, we do not gain information from it. According to Bellinger, Neil mentioned that a collection of data is not information which meant there is not relationship between the pieces of data.

When a pattern exists between data and information, this patter has potential to represent knowledge. Knowledge exists when the person understand the pattern and can interpret the implication. However, interpretation of knowledge leans towards more self-contextualising.

Bellinger (2004) said that a person gain wisdom from understanding the foundation principle (eternal truths) responsible for the patterns representing knowledge. Wisdom is created on its own context. He summarised the following associations:

- **Information** relates to description, definition, or perspective (what, who, when, where).
- **Knowledge** comprises strategy, practice, method, or approach (how).
- **Wisdom** embodies principle, insight, moral, or archetype (why).

The American Heritage Dictionary defines knowledge as the familiarity, awareness or understanding gained through experience or study. Knowledge is the set of ideas or understanding that an entity possesses that it uses to take effective action and achieve its goals. While knowledge is not the same thing as information, which is not the same thing as data, knowledge management involves the manipulation of all three. Data becomes information when it is organized; information becomes knowledge when it is placed in actionable context. The entire knowledge "value" chain must be managed. Therefore, in summary information is simply data that is organized in such a way that it conveys meaning for the receiver.

This paper further divides knowledge into two portions, tacit knowledge and explicit knowledge. In simple terms, tacit knowledge is highly personal and hard to formalise, making it difficult to communicate and share with others. Subjective insights, intuitions and hunches fall into this category of knowledge. Such knowledge is deeply rooted in an individual's actions and experience (Polanyi, 1966). Explicit knowledge is a codified knowledge that can be transmitted in format, systematic language. It is captured in records or documents such as libraries, archives and databases. It can be expressed in words and numbers and shared in the form of data, scientific formulate, specifications, manuals and the like (Polanyi, 1966). These types of knowledge will be discussed further in the upcoming chapters.

The discussions above were just the tip of the iceberg of thoughts on knowledge and knowledge management. My take on knowledge and information is that it encompasses the mental process of understanding and learning of the outside world, through interaction with others and internal processing for better comprehension. Today, there has been a plethora of articles and books on that topic. Sources from practitioners and theorists from education/learning systems, economics/finance, quality/benchmarking, human resources, information/internet technology, research and development and innovation strategy have a common theme; "transformation of the enterprise – profit or not-for-profit – through knowledge management"

(www.entovation.com). From my reading and research, KM for organisation can be confusing, and mind-boggling. Although companies acknowledge that intangible assets like knowledge, creativity and ideas are vital throughout the organisation, but many underestimate the importance of it. This paper will try to understand what KM is and study a company on its KM process.

2.3 The fads and fashion of KM evolution

Chief Economist at Morgan Stanley, Stephan Roach, a strong believer of corporate downsizing reversed his decisions in 1997 saying that downsizing is a recipe for industrial disaster (Wilson, 2002). Outsourcing of IT work, another management strategy will soon be turning its back as the strategy is heading nowhere but the wall. Therefore, is KM a fad and fashion of its time or is it still going strong in the management world?

Davenport mentioned that we live in a culture of the "next big thing". By that, he meant new approaches to improve business performance and management. By it total quality management, process re-engineering, activity-based costing, worker empowerment, balanced scorecards and a thousand other ideas to get business to shape-up.

Organisations that had bad experience with the "next big thing" often criticise such ideas as faddish (Davenport, 2006). Some companies tend to be greedy and implemented new ideas vigorously. Changes take time to materialise. Therefore, it is important to bear in mind to always do things one at a time. It is good to follow the lead of General Electric, which limits itself to five or six ideas/initiatives at any one time (Davenport, 2000). He mentioned companies should determine whether a business idea is faddish or something that can provide real value. Many a times the idea may be great but was adopted for the wrong reason. Companies should follow these attributes (Davenport, 2000):

- Never adopt new business ideas indiscriminately, without regard for fit to the organisation.
- Never treat new business ideas as panaceas that can solve all problems.
- Never drop all former idea-based initiatives in favour of a new one that comes along.
- Use more conservative versions of ideas.
- Never follow others and implement an idea blindly without good evidence that it will work.
- Support till then end – never do things half-way, commit sufficient resources to make it happen.
- Leaders involve personally in the implementation of the idea rather then relying on consultants.
- Don't be greedy – never adopt more idea then you can actually implement.

Davenport summed it up by saying, "there are no faddish ideas – only faddish managers and companies".

2.4 Timeline

This section will examine the origins of KM and how it develops as a field of consultancy practise. After which, it will lead us to the next topic on the literature of KM.

To understand KM, we need to take into consideration the knowledge timeline. KM seen its peak in the 1990s, but in reality, this has been talked about for more than 600 years.

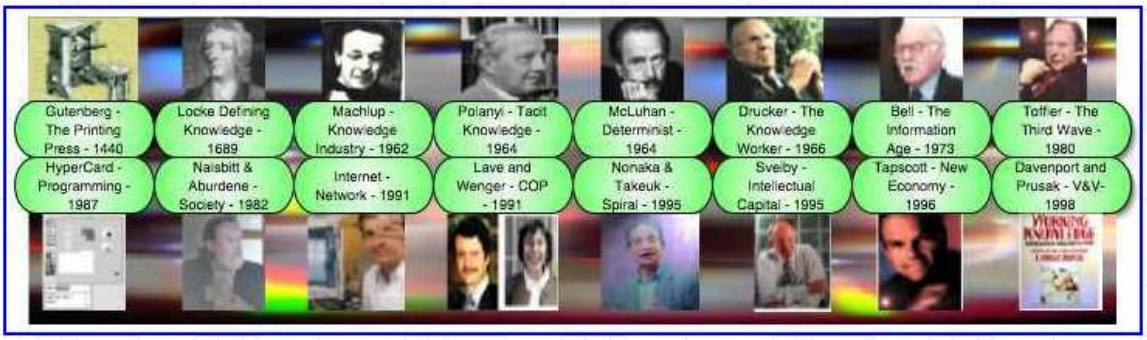


Figure 1: Evolution of Knowledge Management
Source: Donald Clark, 2004

In 1440, German goldsmith Gutenberg[1] developed a printer that could quickly make copies of book instead of relying on hand copies or carved wood block. Printing became the first means of communication. It provided knowledge to more people, faster and cheaper then before.

Locke[2] (1632-1704) hinted what knowledge was about. He divided knowledge into three types: (1) **Intuitive knowledge** which involves direct and immediate recognition of agreement or disagreement of ideas. (2) **Demonstrative knowledge** is how we perceived agreement or disagreement through a series of intermediate ideas. (3) **Sensitive knowledge** is when our sensory (smell, sight, etc.) are caused by things we may not know what causes it.

Machlup[3] (1902-1983) claimed that knowledge industry represents 29 percent of US gross national product. He defined knowledge as a commodity and distinguished five types of knowledge:

- practical knowledge;
- intellectual knowledge, that is, general culture and the satisfying of intellectual curiosity;
- pastime knowledge, that is, knowledge satisfying non-intellectual curiosity or the desire for light entertainment and emotional stimulation;

[1] Source: http://www.nwlink.com/~donclark/history_knowledge/printpress.html
[2] Source: http://www.nwlink.com/~donclark/history_knowledge/locke.html
[3] Source: http://www.nwlink.com/~donclark/history_knowledge/machlup.html

- spiritual or religious knowledge; and
- unwanted knowledge, accidentally acquired and aimlessly retained.

Polanyi[4] (1891-1976) explored on the concept of tacit knowledge –knowledge normally cannot be spoken, but rather demonstrated and imitated.

> *"This fact seems obvious enough; but it is not easy to say exactly what it means. Take an example. We know a person's face, and can recognize it among a thousand, indeed among a million. Yet we usually cannot tell how we recognize a face we know. So most of this knowledge cannot be put into words."*
>
> *~ The Tacit Dimension*

McLuhan[5] (1911-1980) brought on the concept of connectivity and networking. He said that learning methodology, rather it in large classrooms, the vehicle for transporting information to learners should be small group activities, or asynchronous e-Learning.

Drucker[6] predicted that major society changes would be the undoing of information. He argued that *knowledge* has become the central, key resource that knows no geography. According to him, the largest working group will become what he calls *knowledge workers*. The defining characteristic of these knowledge workers is the level of their formal education. Thus education and development, and to some degree training, will be the central concern of a knowledge society.

Bell[7] coined the term information society. By an **information society,** he meant the movement of goods producer (manufacturing) to service economy and that theoretical knowledge, technology, and information become the major mode of commodity. Information, and those who know how to create, assemble, and disperse, are more valued than labor. Information is normally costly to *produce*, but cheap to *reproduce*.

[4] Source: http://www.nwlink.com/~donclark/history_knowledge/polanyi.html
[5] Source: http://www.nwlink.com/~donclark/history_knowledge/mcluhan.html
[6] Source: http://www.nwlink.com/~donclark/history_knowledge/drucker.html
[7] Source: http://www.nwlink.com/~donclark/history_knowledge/bell.html

That is, the cost of producing the first copy of an information good (such as writing a book or recording a CD) is normally quite costly, but reproducing those goods is often negligible.

Toffler[8] postulated the transition of an industrial society (second wave) to information society (third wave).

In 1987 is the age of programming when Apple computer introduced hypertext[9] (created by Bill Atkinson) to the world. Information is stored in a series of "cards" arranged into "stacks." Cards can be linked to each other, just like hypertext links on the Web. A built-in, plain-English programming language, HyperTalk, executes commands. Each card has unique information on it and shares elements with other cards via the background. HyperCard has had a huge impact on the Internet as it inspired the creation of both HTTP and JavaScript.

Naisbitt and Aburdene wrote that we were shifting from an Industrial Society to an Information Society. They mentioned various networks that will transform and increase public access to goods, services and data globally. This network is today's internet.

The Internet[10] was an experiment that started in 1960s by the U. S Department of Defence. After which, the first email program was written. Only in 1991 did the Internet gained momentum and grew to what it was today.

Lave and Wenger[11] pioneered the concept of a community of practice. They said that knowledge was developed through social and spontaneous communities that are driven by common interests and passions, whereas innovation lies in the interaction between different communities.

[8] Source: http://www.nwlink.com/~donclark/history_knowledge/toffler.html
[9] Source: http://www.nwlink.com/~donclark/history_knowledge/hypercard.html
[10] Source: http://www.nwlink.com/~donclark/history_knowledge/internet.html
[11] Source: http://www.nwlink.com/~donclark/history_knowledge/wenger.html

Nonaka and Takeuchi's theorized the creation of knowledge is based upon a spiral movement between explicit and tacit knowledge.

Sveiby [12] advocated that employees are intellectual capital. He argued that the traditional balance sheet is not effective at measuring the real value of a company in that there is normally a big difference between the "book evaluation" and the market value.

Tapscott[13] wrote about the impact of digital networking, analysing that differences of new and old economy. He forecasted the influence internet on children born since 1978. The key technology is the "I-way:" "*Just as the highway system and electrical power grid were the infrastructure for the industrialist economy, so our information networks will be highways for the new economy.*"

Davenport and Prusak[14] introduced the concept of velocity (the speed with which knowledge moves through an organisation) and viscosity (the richness or thickness of the knowledge transferred).

[12] Source: http://www.nwlink.com/~donclark/history_knowledge/sveiby.html
[13] Source: http://www.nwlink.com/~donclark/history_knowledge/tapscott.html
[14] Source: http://www.nwlink.com/~donclark/history_knowledge/davenport.html

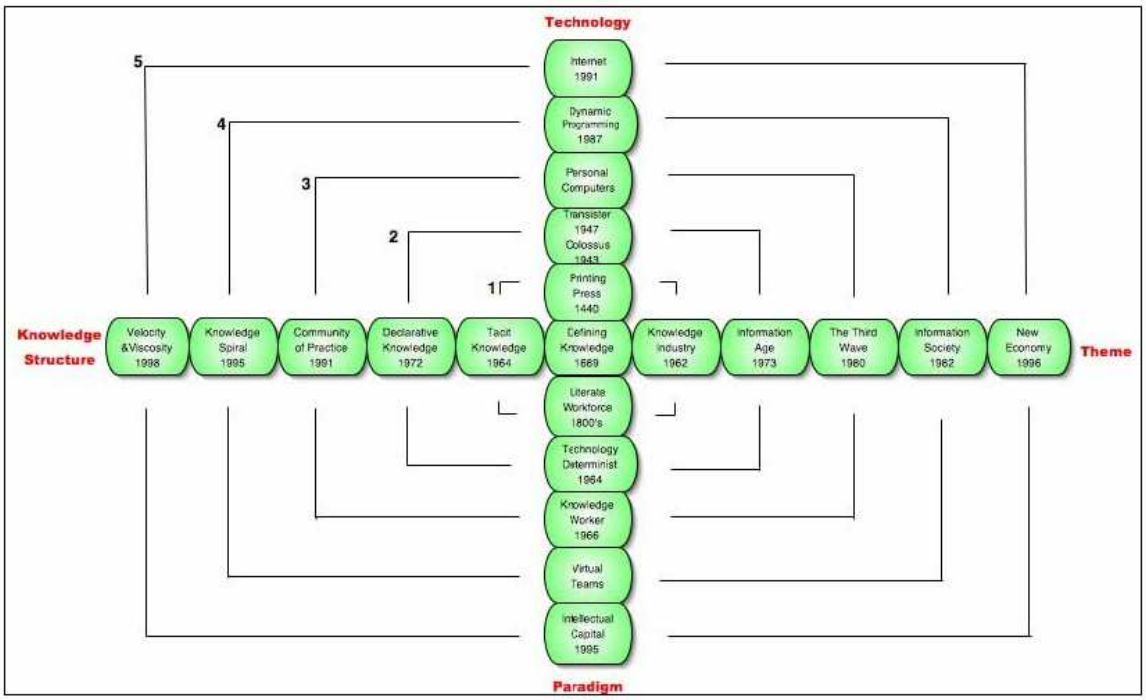


Figure 2: Five themes of Knowledge Management

Source: Donald Clark, 2004

Clark (2004) divided the history of knowledge management into five themes (see Figure 2). This is a summary of his discovery:

Theme 1 – the birth of **knowledge industry** in **1960s**. This was due to technology invention which, was also spurred on by the increased in worker literacy rate. Workers become skilful, with some skills easy to absorb and some requires tacit knowledge.

Theme 2 – the **Information Age (1973).** This was the period when the world discovered computer and the transistor. Thus, the computer was use to manipulate data and help transform data into meaningful information. Transistor started the "mini" revolution by shrinking both the size and cost of computers.

These 3 – the **Third Wave**[15] **(1980).** The Third Wave referred to Alvin Toffler's book published in 1980. Personal computers started dominating the market, enabling people to use the technology at work as well as home. Use of computers allow people to automate tasks and make work easier and faster. Pretty soon, people are making a living with information rather than materials. The combination of information and computers gave form to information systems.

Theme 4 – the **Information Society (1982).** This is the trend of moving from an industrial society to information society. We started learning about knowledge creation of spirals. We also noticed that information depends not only on technology but on the network of people. The concept of Virtual Team started taking form. Organisations started to take notice and understand the dynamic way of working and learning and realised that business is not about managing commodities, but also managing knowledge assets.

Theme 5 – the **Twelve Themes of the New Economy**. With the exponential growth of the internet, creation, using and thirst for information began to gain momentum. Organisations realised the importance of knowledge and try to manage it.

Wilson (2002), Professor Emeritus of University of Sheffield, United Kingdom, in his research paper, performed a search on the *Web of Science* from 1981 to 2002 for papers with the term "knowledge management". According to him, he restricted the search to the title to produce a manageable data file and made the assumption that if the term appeared in the title; the paper is likely to focus on that topic. His search result is shown in Figure 2.

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[15] **The First Wave**: People stayed in one place and developed a sense of cyclical times, it that it repeated itself with cycles of moons, crops, and seasons. Everyone worked on the farm and people were generalists -- able to do many things.
The Second Wave: Our tools progressed and we produced ships, railroads, and automobiles. To build all this, we invested in expensive equipment and people (labor).
The Third Wave: The industrial society brought huge companies and military organizations that needed to track what they had and what they were doing, and what they were spending. Information becomes abundant.
(Source: http://www.nwlink.com/~donclark/history_knowledge/toffler.html)

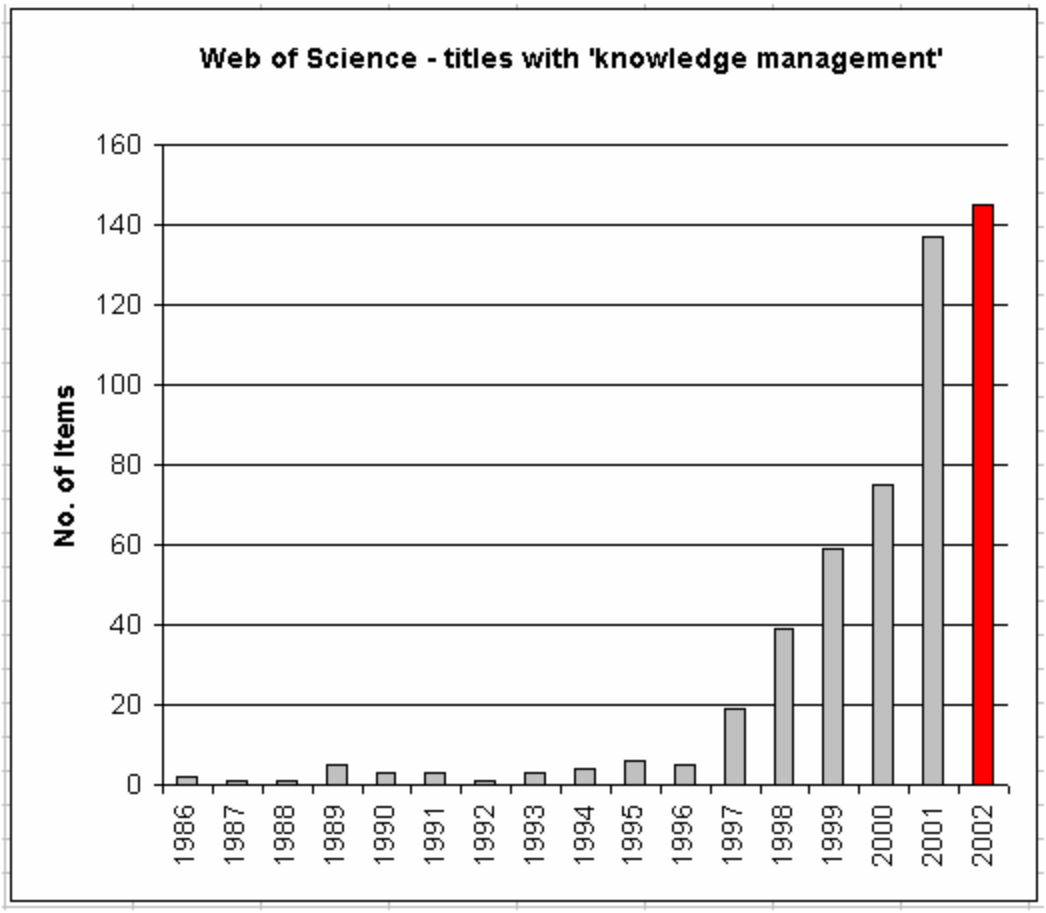


Figure 3: Web of Science, titles with knowledge management

Source: T. D. Wilson, 2002

As we can see from the chart above, not much was written about KM in the late 1980s. But the titles grew exponentially from late 1990s till today. This showed the growing interest in knowledge management. According to Wilson (2002), from 1986-1996 there was a wide range of subjects representing KM. Journals with the largest single category dealt with artificial intelligence and expert systems, followed by general aspects of computing, decision support systems, information technology and other miscellaneous subjects such as databases, digitisation, geographical information system and human-computer interaction. Prior to 1997, publication on KM meant some form of application of computers based on the expert systems field. However, the

turning point came in 2001. Marwick in Wilson's paper mentioned that people realised that there are significant shortfalls in the ability of technology to support the use of tacit knowledge. Face-to-face communication is more effective in tacit knowledge sharing. Technology is only the strongest when it is contributing to solutions that dealt largely with explicit knowledge such as search engine and classification.

The above are just some interesting development on KM. Let us dwell a little further into the academic world to see what has been said about KM.

3 KM from the Academic's perspective

A peek at the timeline mentioned above, KM has been around for quite a while. There is a long history of philosophical interest and inquiry into knowledge or epistemology from Plato to Descartes to Polanyi. From a platter of distinguished researches, this paper narrowed down to three well-known KM figures, first on Nonaka on his idea of knowledge creation then to more recent experts, Malhotra and Davenport on the current scenario of KM.

3.1 Ikujiro Nonaka on creating knowledge

Ikujiro Nonaka co-authored with Hirotaka Takeuchi a highly influential book, *The Knowledge Creating Company (1995)*. The book tried to discover how Japanese companies dominated the world in the automobile and electronics industries. The height of the book described the transferring of skills from an expert bread baker into an automatic bread maker machine; unveiling the secret of Japanese companies' success in creating new knowledge and using it to produce successful products and technologies.

Nonaka (see Appendix A for his biography) and Takeuchi's idea on the spiral of organisational knowledge creation burst into the scene, introduced the issues of tacit and explicit knowledge, and also the important role of individuals in the creation of organisational knowledge. The following portion will focus on Nonaka and his take on knowledge creation.

3.1.1 The Spiral of Organisation Knowledge Creation

At the heart of Nonaka and Takeuchi's work were the two types of knowledge, tacit and explicit. As mentioned in the earlier chapter, tacit knowledge is subjective. Tacit knowledge and experience cannot be expressed with words, sentences, numbers or formulae. It also includes cognitive skills such as beliefs, images, intuition and mental models and technical skills such as craft and know-how. Explicit knowledge is objective and rational knowledge that can be expressed in words, sentences, numbers or formulae. It includes theoretical approaches, problem solving, manuals and databases (Spencer, 1997).

Nonaka's knowledge transfer as a spiral process also known as the **SECI** (**S**ocialisation, **E**xternalisation, **C**ombination and **I**nternalisation) model starts with a 2x2 matrix (see Figure 4).

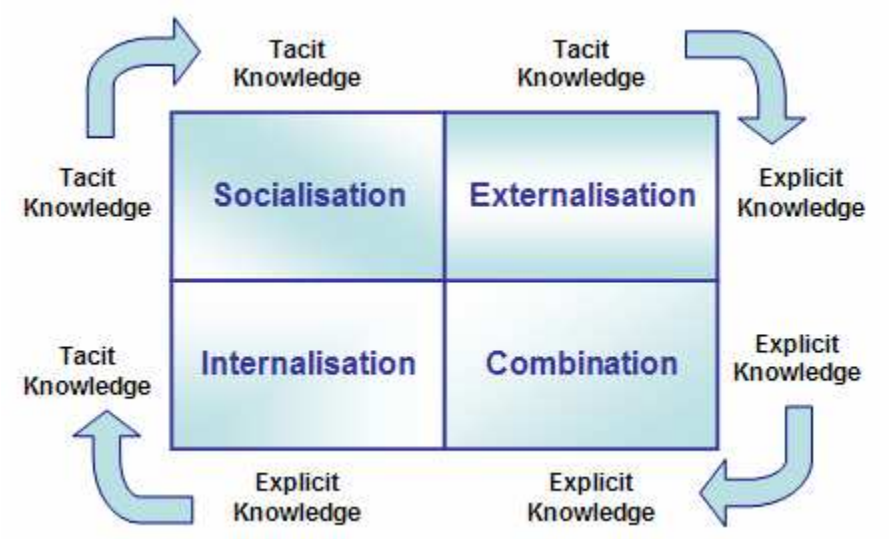


Figure 4: Nonaka's Four Modes of Knowledge Conversion, SECI
Source: Nonaka and Takeuchi, *"The Knowledge Creating Company",* p. 62, 1995

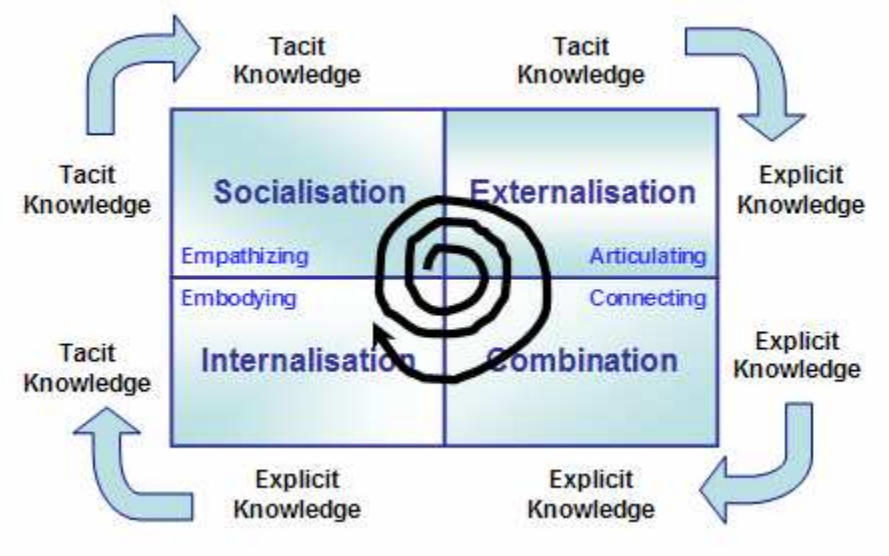


Figure 5: Spiral of knowledge creation

Source: Geytere (200?), http://www.12manage.com/methods_nonaka_seci.html

Each of the knowledge can be converted. The model becomes clockwise spiral when viewed as a continuous learning process. The process of knowledge creation is based on double spiral movement between (i) tacit and explicit knowledge, (ii) individual-group-divisional and corporate-wide levels (see Figure 5).

The process that transfers tacit knowledge from one person to another is called **socialization**. Socialization is a process of creating common tacit knowledge through shared experiences. This can be achieved through direct interaction with people (customers, suppliers and vendors) outside of the organisation as well as people (employees, contractors and consultants) within the organisation. It is primarily an exchange process between individuals.

The process of converting tacit knowledge to explicit knowledge is called **externalization**. Externalization is the articulation of concepts and/or diagrams using metaphors, analogies, ideas or images in words and sketches. Dialogue plays an important role in translating tacit knowledge into readily understandable form of communication. People share beliefs and articulate their thinking during face-to-face

communication for instantaneous feedback and stimulating exchanges of ideas and concepts. Simply put, externalization is a process among individuals within a group.

Once knowledge is explicit, it can be transferred in its explicit form through a process termed as **combination**. According to Nonaka, combination is a process of assembling new and existing explicit knowledge into a systematic knowledge such as a set of specifications for a prototype of a new product. This is the area where information technology is at its best, because knowledge can be conveyed in documents, email, databases as well as through meetings and conferences. The relevant information must be edited and processed to make it user-friendly. Combination allows and facilitates knowledge transfer among groups across organisations.

Internalization is a process of understanding and absorbing explicit knowledge into tacit, operational knowledge by individual. This mode is triggered through "learning by doing or using". Such knowledge is then documented into text, sound or video formats. Keeping manuals and/or documents is a good example of such knowledge. The internalization process transfers organisation and group explicit knowledge to the individual.

Nonaka also shared his thoughts on when does knowledge spiral takes place and under what condition. He said that knowledge spiral can happen anywhere. It could be:

- Physical – office
- Virtual – email, teleconferencing
- Mental – shared experiences, ideas, beliefs
- Relationship – people sharing common goals

Within an organisation, there are five elements for knowledge creation. These five enablements are vision, strategy, structure, system and staff.

Knowledge **vision** is a working premise for knowledge (Spencer, 1997). Spencer cited these examples:

- 3M Innovation – *Thou shalt* not kill a new idea.
- Walt Disney – Continuous progress via creativity, dreams and imagination. No cynicism allowed.
- Sharp – Opt electronics. Don't imitate, make a product to be imitated.

Nonaka provided two contrasting aspects on **strategy**. A product strategy leads to "production identification", which has fixed and separate resource perception leading to inefficient new product development. Product strategy ultimately leads to management strategy based on physical assets. As such, organisation is structured as a strategic business unit making specific products. This defined the production and/or market boundary. In a nutshell, the organisation thrives due to specialisation (expertise) on making specific things. The other aspect is knowledge strategy. The organisation identifies itself around core knowledge, with linkages to the market. This resulted in efficient new product development. Based on such knowledge, management focused on creating and dissemination such knowledge. Work units were designed to facilitate and enable self-organising of knowledge. Such organisations are boundary-less but are constrained by cognitive limitation of individuals.

The third enabler is **system**. Nonaka described system as the networking of communities of knowledge, between competitors, customers, related industries, regional communities and subsidiaries. He quoted Sharp as an example. Sharp organisation is structured into corporate innovation system for technology and products. The purpose is to identify potential technological development. One method of doing so is to identify urgent development project teams. These teams are empowered to recruit personnel and procure equipment and/or facilities with the budget set by headquarters. The teams span more than three business groups with a deadline of 18 months. A visible sign of power and authority is the Gold badge. Additionally, there is also a planning group to focus on market needs, the lifestyle planning groups collaborate research with companies in other industries. Another group is the trend

leader system of 600 leading consumers ranging from high school students to senior citizens. This group reviews new product concepts which are then broken down into smaller product focus group.

The fourth enable is **structure**. Nonaka discussed two forms of organisation, one a fractal organisation which is capable of speed and agility and is very good at socialisation and externalisation. In stark contrast, bureaucracy, with a hierarchical, division of labour and specialisation, is exceptionally good at combination and internalisation.

The final enable is **staff**. Nonaka stressed the importance of middle managers in what he termed as the "Middle-Up-Down Process (MUD) of knowledge transfer. The rule of such middle managers is to be supportive, nurturing, caring, initiative to complete the knowledge spiral. They play a critical role between the upper echelon (senior management) and the worker bees (front line support personnel). Grand theories are translated and tested on the front line. Problems and contradictions flow back to middle management which is then communicated to the top tier. This action is termed as "cross-levelling of knowledge".

3.1.2 Knowledge Assets

Knowledge assets are company specific resources that are indispensable for creating value for the organisation. These are the inputs, outputs and moderating factors of knowledge creating process.

To effectively manage knowledge creation, Nonaka said that a company has to "map" (catalogue) its knowledge assets. Inventorying (documenting) may not be enough as knowledge assets are dynamic. New knowledge is created daily from existing knowledge assets. Geytere (200?) provided us with these four categories of knowledge assets:

1) Experiential knowledge assets

Tacit knowledge through common experiences:

- skills and know-how of individuals
- care, love and trust
- energy, passion and tension

2) Conceptual knowledge assets

Explicit knowledge articulated through images, symbols and languages:

- product concepts
- design
- brand equity

3) Systematic knowledge assets

Systemised and packaged explicit knowledge

- documents, specifications, manuals
- database
- patents and licenses

4) Routine knowledge assets

Tacit knowledge embedded in actions and practices:

- know-how in daily operations
- organisational routines
- organisational culture

From the above, we can summarise that Nonaka stated that true knowledge comes from gut-level commitment and strong belief. Building and conveying knowledge requires shared emotion, feeling, mental models, experiences and what he called as "empathy space".

The SECI model is based on Polanyi's (1963) distinction between tacit and explicit knowledge. It provided an understanding of knowledge creation and management from

the perspective of a Japanese business culture. The theory appreciates the dynamic nature of knowledge and knowledge creation. It also provided a framework for management of the relevant processes. On the other hand, we must bear in mind that the study is based on Japanese organisations. The Japanese work culture depends heavily on tacit knowledge and employees normally work with a company for life although, this trend is slowly changing.

3.2 Davenport on knowledge workers

The section above discussed about tact, explicit and knowledge spiral. It also revealed to us that knowledge is a great asset to a company. Let us take a look at how knowledge are being used and who uses these knowledge.

Davenport[16], perhaps one of the most influential business gurus, helped deliver many of the biggest trends to shape business over the past 25 years. He is an author, co-author, or editor of ten books. He wrote some of the earliest articles and books on business process reengineering, business use of enterprise systems and knowledge management. Lately, he has been exploring the nature of the thinking that went into these and other business innovations. (Harvard Business School Press, 2003). Steve Kerr managing director and chief learning officer at Goldman Sachs once said, "Tom has the intellectual rigor to come up with game-changing ideas, and yet he's not isolated in some ivory tower. He's hardwired into big, complex companies, which gives him a real-world understanding of how to put those ideas into play." (Breen, 2004).

The Economist in its February 2005 edition printed that in the early industrial age, men in white coats would walk around factories with watches and clipboards measuring time it took for workers to perform specific tasks. The "time-and-motion" experts are

[16] Thomas Davenport holds the President's Chair in Information Technology and Management at Babson College in Wellesley, Massachusetts, USA. He is Director of Research for Babson Executive Education and has directed research centres at Ernst & Young, McKinsey & Company, CSC Index and Accenture Institute of Strategic Change.

measuring labour productivity, and how to improve productivity. The world today is far remove from such manufacturing work. America has less then 10 percent and Britain less than 15 percent of jobs are in the manufacturing field (The Economist, 2005). Post millennium workers are employed largely in the service sector and are paid for their brain. These are the knowledge workers.

3.2.1 Who are the knowledge workers?

Davenport said that knowledge workers' primary task involved manipulation of knowledge and information. These workers are innovators, designers and marketers of each company's products and services. According to Davenport, they are the strategists, executives and IT specialists whose ideas and expertise fuel the company's success. These are the creators of wealth in many economies today.

In a nutshell, the term knowledge workers refer to the people whose primary job is to do something with knowledge by creating it, distributing it and applying it via decisions or actions.

3.2.2 Are company doing a good job of managing knowledge workers

The big question to ask is, are knowledge workers delivering the promise – showcasing their best performance? Davenport argued that many companies failed to maximise the productivity of their knowledge workers because they apply the one-size-fits all management technique which is ineffective. Or, company does not even manage these workers at all. According to Davenport, knowledge workers are vastly different from other types of workers in their motivations, attitudes, and need for autonomy. Thus, they require unconventional management techniques if they are to be more productive.

He identified a few problems as to why companies are not getting better performance from knowledge workers.

i) HSPLTA

Most companies do is *hire smart people and leave them alone* (HSPLTA). A lot of effort is spent on accessing and recruiting knowledge workers prior to hiring them. But once they are hired, companies do not do a lot to improve their performance. There is no quality measurements, no Six Sigma, no reengineering (Davenport, 2003). Traditionally, process improvements are targeted at transactional workers, manufacturing workers or people in call centres (Alter, 2005). Davenport (2005) revealed in an interview that IDC found that 1,000 knowledge workers can lose as much as US$6 million a year just searching for nonexistent data or repeating work that has already been done.

ii) They are not the same

Companies treat all knowledge workers alike. This provides convenience and efficiency by imposing the same standard solution on everybody but people work in different ways. There are "sitters" and there are "movers". There are "talkers" and there are "thinkers". Some like working at home, others cannot get a thing done there (Davenport, 2003).

iii) Spending more money is not the solution

Companies are spending billions on IT to help knowledge worker but yet knowledge workers are not getting more from these investments (Alter, 2005). The money is spent on IT infrastructure and applications upgrading, but not on training or education – teaching the knowledge workers how to use these tools effective. In an interview, Davenport shared an anecdote on call transfer. He said, try calling somebody in a big organisation and request for a call transfer and most of the time (90 percent) people will say, "Gee, I'm not sure I remember how to transfer. Here's John's number just in case". Call transfer has been around for the past 40 years. The same issue appears

true for other devices such as, laptops, desktops. PDAs, cell phones, blackberries, and many more

iv) Storage no issue

Organisations create one big common repository to store knowledge for all workers. Management attempt to intervene in knowledge work but was not successful. This is partly due to not knowing how knowledge workers accomplish their work.

v) The other stuff

We now know that knowledge workers need good processes and technology. Apart from that, they also need an organisational structure that does not tamper with their work. An office environment with facilitates for both concentration work as well as free reign to interchange ideas with co-workers are ideal. With the right combination of team structures and individual accountability, productivity will be heading north.

3.2.3 Make it happen

In his Working Knowledge book, Davenport (2000) stated that all healthy organisations generate and use knowledge. This is provided that they interact with the environment and absorbed what has been learnt (see Figure 6). Without knowledge, organisations could not organise itself and would be unable to function as an enterprise.

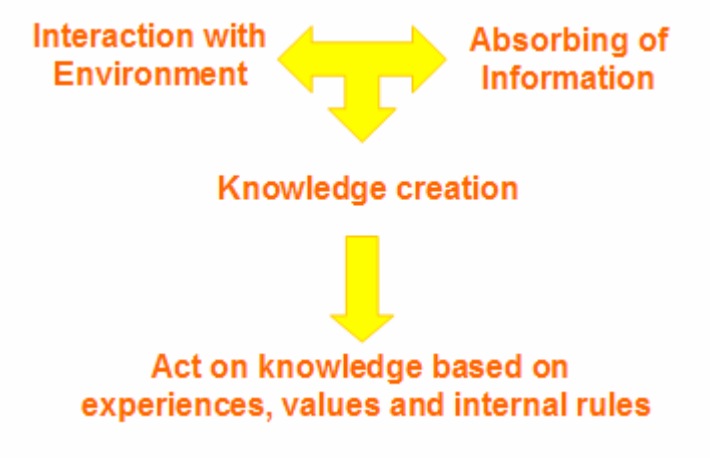


Figure 6: How organisations generate and use knowledge
Source: Working Knowledge, Davenport, 2000

Let us look at one example. Westinghouse Corporation was an innovative firm in terms of the products and services offered in the marketplace. The company invented electric power plant, air brakes, shock absorber, nuclear power, commercial radio, radar, frost-free refrigerators and many more. Despite these innovations, its businesses was dismantled and sold-off. In comparison, General Electric (GE), Westinghouse's competitor from the late 19th century, became one of the world's most valuable conglomerates. Known as an innovative company, GE has diverse corporations in several businesses such as broadcasting, power generation, industrial equipment, financing and so on.

Why the disparity? There are many factors in these two companies' fortune. Perhaps luck has a place in it. But most importantly, it is GE's dynamic and vibrant managerial culture. Powered by ideas and better-managed company then Westinghouse, it created a substantially better long-terms survival.

To put all that into perspective, Davenport (2000) built a framework for companies to start thinking about how to make process more productive. He looked at the ways different workers use knowledge. The framework, which is continuously evolving, ranged from the best technologies that gather and disseminate information which knowledge workers need, to the sort of workspace best suited to mobile people and

how need to do lots of concentration. He identified five major categories of knowledge workers, acquisition, dedicated resources, fusion, adaptation and knowledge networking.

Acquisition	o "Steal" the best idea (copy from competitor). o Buy it – employ knowledge workers. Example: IBM purchase Lotus. o Leased/rent it – help from consultants, university or institutional research.
Dedicated Resources	o Establish units or groups for the purpose of generating knowledge. o Separate Research and Development (R&D) from other parts of the firms to provide researchers freedom to explore ideas without constraints.
Fusion	o Fuse variety of knowledge from different groups to provide diversity and creative chaos. o Manage these different groups carefully to build positive collaboration of different styles and ideas.
Adaptation	o Change with the environment. o Innovation is the way forward, but beware of the winner's curse.
Networks	o Knowledge is generated through informal, self-organising networks within organisation which over time may become more formalised.

Figure 7: Five major categories of knowledge worders
Source: Davenport, Thomas, *Working Knowledge,* 1998, 2000, pp. 52-87

The most radical change of all is for organisation to start focusing on job-specific knowledge and information environments. A good learning program for knowledge

workers would be a combination of classroom training and "just-in-time" (JIT) learning at the workstations. JIT learning will address the problem instantly as and when workers have an issue.

According to Davenport (2005), managers should learn how to:

- Identify their company's most crucial category of knowledge workers.
- Choose appropriate interventions and performance measures.
- Use computers to mediate and structure knowledge work.
- Select the most effective technology devices to support workers.
- Understand the value of social networks and facilitate their use.
- Structure the physical environment to maximise productivity.

3.2.4 Challenges

One of the challenges is to get people to share knowledge. Workers do not feeling that they are getting any returns from sharing knowledge. One way of preventing knowledge monopoly within a company is for management to ensure knowledge is not confined to a certain group, for example the R&D organisation. Companies should start to cultivate the belief that knowledge is everybody's business. Everyone creates, shares and uses knowledge instead of hoarding it (Prusak and Davenport, 2003).

Another challenge is to codify tacit knowledge. Some of them cannot be written down in a database or else described in a document to make it explicit. The only way that such knowledge can be transferred is via teaching through long-term observation of people who have such knowledge. Mentoring and apprenticeship programs are ways to transfer tacit knowledge. Mentoring is an important type of learning relationship, but the purpose (constructive learning) must be made clear to people (Garvey and Williamson, 2002). This requires time and effort on the giver and takers.
Another one is to systematise the dissemination of corporate knowledge. One can start by formalising the knowledge network. Start with the human first, not technology. In

Davenport and Prusak's Working Knowledge book (2000), organisation should not spend more than one-third of their time thinking about technology for knowledge management. The other two-third should dwell into culture, organisational roles and responsibilities by focusing on the knowledge content, strategy and economics. These are not easy task. Organisational chart reflects power, not knowledge. Individuals must create "knowledge yellow pages", to know who knows what.

Little has happened in the interim, party because it is not an easy task. There are no studies that can measure the thoughts that go through knowledge workers' head or the value of their creative output (The Economist, 2005). But there are a few ingredients for a successful knowledge management project. But the most important factor of all is a fit with the organisational culture, leadership and a tie to economics or business value. Never spend too much time acquiring and managing knowledge. Knowledge and learning should encompass a broader outlook of the organisation. A good balance between knowledge and action is the key to organisational success.

3.3 Malhotra on the gap of KM

Davenport in Section 3.2 above categorised knowledge workers into five sections. He also touched on some of the challenges faced by knowledge workers. In the section below, we will be briefly discussed the gap in KM and what drives business performance.

According to Malhotra[17], the impact of KM can be seen everywhere but in the KM performance statistics (2003). Worldwide, KM influence has grown in industries, organisations and institutions. It has embedded in the policy strategy and implementation of processes of global corporations, governments and institutions.

[17] Dr. Yogesh Malhotra serves on the Faculty of Management Information Systems at the Syracuse University. He has taught in the executive education programs at Kellogg School of Management and Carnegie Mellon University. He is the founding chairman of BRINT Institute, LLC.

Malhotra (2005), said that global KM market has projected to reach US$8.8 billion. The KM business with CRM (Customer Relationship Management) is expected to grow to US$148 billion. It is also expected to save companies US$31 billion in annual reinvention cost for Fortune 500 companies. According to Malhotra, KM has a broader reach into learning, education and training industries.

The impact of KM is great but in his paper (p.8, 2005), the financial performance of 7,500 companies relative to their IT spending and individual surveys of more than 200 companies revealed that:

- companies with best-performing IT investments are often most frugal IT spenders
- top 25 performers invested 0.8 percent of their revenues on IT in contrast to overall average 3.7 percent
- highest IT spenders typically under-performed by up to 50 percent compared with best-in-class peers

This shows that lower IT investment yields higher returns. Strassman (1997) emphasized that it is not computer but what people do with them matters (Malhotra, 2005).

3.3.1 Disconnection between IT and knowledge

"Despite increasing sophistication of KM technologies, we are observing increasing failures of KM technology implementations."

~ Malhotra, 2005

The new IT business models made it possible to deliver anything, anytime and anywhere to those that need it. It is able to digitally connect channels across organisations and geographical boundaries. All these are expedited with the explosion of technology architectures from mainframe to client-server to the internet including the web and web services. Organisations with legacy enterprise business applications

playing catch-up with the newer business technology have ended up with islands of diverse technologies (Malhotra, 2005).

With diverse technologies, managing and coordinating its data architectures and system architectures pose a great challenge. The challenge resulted from the need for integrating diverse technologies, computer programs and data sources across internal business processes (Malhotra, 2005). The challenges are increased manifold when such technologies require upgrades, or changes in the existing technologies or replacing them with newer technologies. Diverse technologies often have too much processed and unprocessed data. As a resulted, organisations do not know what they have. Malhotra puts it simply as "they have incomplete knowledge of explicit and tacit data, information and decision models available within the enterprise". This position the organisation is in a disadvantage situation as the organisation needs such information (which, may be incomplete and/or outdated) to make strategic decisions.

The gap between IT and business performance has grown with the shifting focus of business technology strategists and executives. According to Malhotra, technology sales forecast are gloomy because of the distrust of business executives who were previously oversold on the capabilities of technologies to address real business threats and opportunities.

Listed here are the lessons learnt from some of the most successful business enterprises as portrayed by Collins (2001) which is excerpted from Malhora (2005). We want to know what distinguished these businesses by making the leap from "good to great":

- No evidence was found that good-to-great companies had more or better information than the comparison companies. In fact, both sets of companies had identical access to good information. The key lies not in better information, but in turning information into information that cannot be ignored.
- 80 percent of the good-to-great executives did not even mention technology as one of the top five factors in their transition from good-to-great. We know for

certain it was not because they ignored technology; it was because they were technologically sophisticated and vastly superior to their comparisons.

- Technology-induced change is nothing new. The real question is not "What is the role of technology?" Rather, the real question is "How do good-to-great organisations think differently about technology?"
- It was never technology per se, but the pioneering application of carefully selected technologies. Every good-to-great company became a pioneer in the application of technology, but the technologies themselves varied greatly.
- When used right, technology becomes an accelerator of momentum, not a creator of it. The good-to-great companies never began their transitions with pioneering technology, for the simple reason that you cannot make good use of technology until you know which technologies are relevant.

3.3.2 What is the real driver of business performance

Malhotra (2005) provided some case studies as to why some businesses succeed in KM while others fail. These are some of them:

Wal-Mart

Wal-Mart emerged as a company that set the benchmark of doing more with less. It did not invest heavily in the latest technologies to gain competitive advantage. Malhotra (2005) quoted a McKinsey Global Institute report:

"The technology that went into what Wal-Mart did was not brand new and not especially at the technological frontiers, but when it was combined with the firm's managerial and organisational innovations, the impact was huge".

Wal-Mart business model created strong linkages with suppliers that worked in two fold. First, it reduced costs of technology invested and two, commit suppliers to the success of the shared systems.

Dell

Dell is one company that does more with less. Over the past 17 years, it perfected its business model by developing strong ties with its customer base. It also cultivated strong relationships with its virtual supply chain partners including outsourcing providers (Solectron) and technology vendors (HP, Sony and EMC).

Its success is aided by a suite of carefully chosen technologies. According to a survey of 7,500 companies conducted by Alinean (2002), Dell is a thrifty IT spender.

General Electric (GE)

GE is renowned for its emphasis on the Six Sigma quality. The company claims operational savings of 35 to 60 percent in costs involved in customer response, customer service and sales. Most of these savings are attributable more to management control rather than to technologies that are used to enforce pre-negotiated contracts on its buyers who deal with its various suppliers.

Cisco

Cisco's Chief Financial Officer (of that time) in a Harvard Business Review article (Cartel, 2001) claimed that:

"We can literally close our books within hours... the decision makers who need to achieve sales targets, manage expenses and make daily tactical operating decisions now have real-time access to detained operating data."

Unfortunately, its real-time access to data was not much of a help when it made some incorrect assumptions about the future. Cisco ignored a key lesson of KM that is often ignored by many others: the past may not be an accurate predictor of the future. Other networking companies with less sophisticated technologies had cut back on production schedules months earlier seeing impending downturn in demand, Cisco stuck to the forecasts of their "virtual close" system that they considered invincible. The technology had never been wrong before. As a result of misplaced faith in the power of the

forecasting systems, Cisco ended up writing off US$2.2 billion in inventories and sacking 8,500 employees.

This case demonstrated that even the best technology offers no protection against bad management decisions.

Enron

Entron leveraged its online exchange for facilitating instantaneous transactions in the online trading of energy market commodities. In its communication submitted to the Federal Trade Commission, Enron had emphasized that:

"Efficiency gains made possible by dynamic pricing and trading are especially well suited to Enron's on-line business because electronic trading can match the speed with which commodity pricing changes. Transactions that used to take up to three minutes to complete over the phone now take just a second or two, including complex processes such as credit checks."

The company sought out new technology as much as possible and planned to spend hundreds of millions of dollars on technology infrastructure. When the collusion between Enron and its auditing firm was uncovered, the real-time enterprise system triggered the freefall of Enron as the system was instructed to cover risk exposure related to its instantaneous transactions. Overly optimistic belief in technology as the means for generating profits despite an inadequate business model led to Enron's downfall resulting in one of the largest corporate bankruptcies in US history.

3.4 In a nut shell

We have no doubt that KM is all over the place, used by many companies. KM is about getting the right information to the right person at the right time. But nobody asks what kind of knowledge is to be managed and toward what end. The search for the "next big thing" is to blame for its narrow focus on IT and innovations for achieving competitive and sustainable business performance. For most mature organisation, the challenge is in forging ties between KM and fundamental business strategy. Although business academics have stressed on the internal role knowledge plays in business strategy and organisational performance, nevertheless, these findings are still on paper, and only rarely made way into practice.

Malhotra recommended that:
1) Organisational function should drive the choice of organisational form; and
2) Ends should drive the choice of means

Although some people may term KM as a business fashion or fad, KM is here to stay. We are 100 percent sure that knowledge is one of the organisation's most important assets (Davenport, 2000). No doubt KM will continue to evolve. Real success does not come from cutting and pasting knowledge activities onto existing work processes. Successful businesses did not adopt the latest technologies offered in the market; rather, they view technology as an accelerator of business momentum and not as its creator.

4 KM from the Consultant's perspective

The above discussed some of the KM theories and ideas from academics' point of view. Let us turn our attention to the other side of the coin, and look at what consultants also termed as "service knowledge" has to say about KM and if knowledge can be managed.

Various numbers of professional service firms are peddling their wares on KM. In the 1990s, those who want massive Notes repositories look towards firms such as Andersen Consulting (now known as Accenture), Price Waterhouse (now known as PriceWaterhouseCoopers) and IBM/Lotus Consulting. For web-based knowledge infrastructure, Booz, Allen and Hamilton or KPMG is worth getting a close look. For the company interested in building a system to manage network of internal experts, look no further than Teltech. For a well-crafted knowledge library, American Management System (AMS) and Ernst and Young may just have the answer. Virtually every consulting firm will let you know that its KM methodology is a mixture of "people, process and technology" (Davenport, 1997).

Let us take a look at some of the well-known consultancies to discover what KM means to them.

4.1 Karl Erik Sveiby

Sveiby [18] (2006a) wrote the world's first book on KM under the Swedish title, "Kunskapledning" ("The Flow of Knowledge") in 1990, which was awarded the best management book in Sweden. Currently, he has published twelve books on that subject. His main work is how to measure the intangible assets of intellectual capital.

[18] Karl Erik Sveiby is based in Helsinki, Finland. He is a principal of a global network of consultants, SKA, Sveiby Knowledge Associates.

In his frequently asked questions (2006b) website, he shed some light about what is KM, can it be managed and if KM the latest fad.

For Sveiby, KM has two movements. The first is knowledge focused, whereby "the value in knowledge comes out when its many forms are leveraged." This stream is influenced by Nonaka's and his own works. The second is information focused on "the value in knowledge comes out when it is made explicit in the form of information".

He does not believe that knowledge can be managed. Quoted from his Frequently Asked Questions website, "Knowledge Management is a poor term, but we are stuck with it. I suppose 'Knowledge Focus' or 'Knowledge Creation' (Nonaka) are better terms, because they describe a mindset, which sees knowledge as activity not an object. Knowledge focused is a human vision, not a technological one."

On his take if KM is a fad, he said that "KM defined as Information focused: yes definitely a fad, because the returns on the enormous investments now made under the label 'KM', will not be justified. KM defined as knowledge focused: No, we have not even scratched the surface!"

4.2 Peter Drucker and Frank Miller

Wilson (2002) mentioned two other consultants, Drucker and Miller. This is what he wrote about Drucker. Drucker was one of the first to write about knowledge society and the knowledge economy in 1969. He disputes that knowledge can be managed. He mentioned that when an employee leaves the company, the knowledge goes with them, no matter how much they have shared. At the Delphi Group's Collaborative Commerce Summit, Kotzer (2001) reported Drucker as follows:

"You can't manage knowledge. Knowledge is between two ears and only between two ears."

~ Peter Drucker

Wilson (2002) also mentioned about another independent consultant called Miller. This is what Miller has to say about KM: "...knowledge is uniquely human capability of making meaning from information – ideally in relationships with other human beings..." Knowledge is, after all, what we know. And what we know can't be commodified. Perhaps if we didn't have the word 'knowledge' and were constrained to say 'what I know', the notion of 'knowledge capture' would be seen for what it is – nonsense!"

The three views listed above are independent and individual opinion. Let us take a look at a few selective consultancy firms on their say about KM.

4.3 Accenture

Established in 1989, Accenture (former Andersen Consulting), is a global management consulting, technology services and outsourcing company. It has long been in the information technology management business offering business integration solutions that aligned organisations' technologies, processes and people with their strategies.

Ryder Systems Inc. (www.ryder.com), wanted to capture and share the knowledge and innovation developed by its people. This transportation company required its operation teams, working in various locations to have real-time access enabling them to work virtually with their global counterparts. Accenture help customised an online knowledge management system which accelerates exchanging of ideas, best practices on logistics solutions across the various project teams.

"People—the knowledge they have and the new knowledge they create—are the corporate assets that impact Ryder's performance more than any other form of capital,"

says Gene Tyndall, Ryder's executive vice president of Global Solutions and eCommerce (www.accenture.com).

The above is just one of the examples demonstrated the use of knowledge as an information accelerator. Let us look at another consulting company.

4.4 Deloitte Consulting LLP

Wilson (2003) wrote that Deloitte and Touche claimed that its KM is amenable to technical solutions. His quoted from Eyler (2001):

> *"Deloitte Consulting provides system consulting and implementation services for knowledge management solutions in a wide range of applications and scales. The solutions include data warehouse systems, enterprise system integration (data exchange system) with middleware, and workflow or document management systems with groupware such as Lotus Notes/Domino."*

4.5 Gartner

Gartner aims to deliver technology-related insight so that their clients make the right decisions. It has served 10,000 organisations, including chief information officers and other senior IT executives in corporations and government agencies, as well as technology companies and the investment community (www.gartner.com).

A search of its website returned an article, "Knowledge Management Enables the High-Performance Workplace (HPW)" by Kathy Harris. Quoted from that article,

> *"KM supports the notion of an HPW through organizational values, culture, processes and tools that stimulate and support the organization's employees, partners and customers to create, capture, organize, access and use the*

organization's knowledge that enables people to personally and collectively become more productive, collaborative and innovative"

It also examined the trends, challenges and opportunities that are influencing the direction and application of KM (see Figure 8).

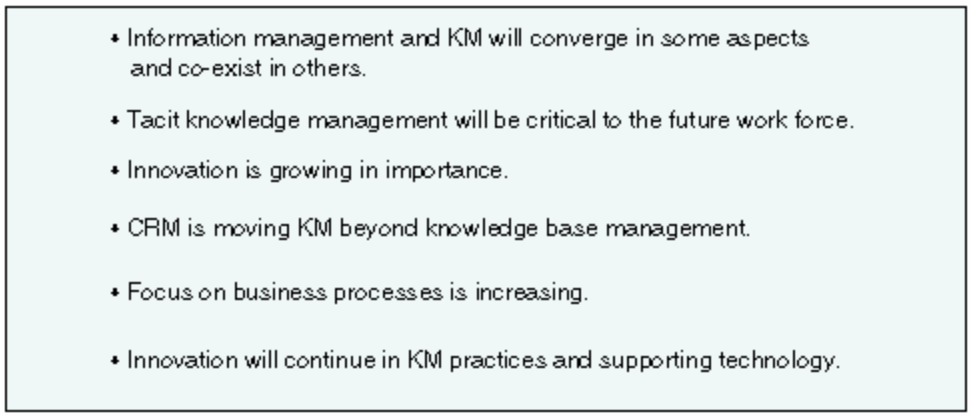


Figure 8: Trends influencing the direction of KM
Source: Gartner, February 2006

Gartner also defined that "KM is not a separate class of technology, and strictly speaking, KM does not require the use of software. However, we believe that compelling technology is necessary to a good KM program. Further, technology is always emerging that advances the state of the art of KM, making things possible that were not possible before."

4.6 The others

As for the other consulting firms like, Ernst and Young, KPMG, McKinsey and Company and PricewaterhouseCoopers (PWC) not much can be found on KM. Wilson (2002) said in his research paper that PWC business under KM has been "renamed" to "Intellectual Asset Management Practice". It dealt in the aspects of mergers/acquisitions and security.

From the information gathered, it is noted that KM meant different things to different consultancy companies. Some are more focused on KM, others are not. Perhaps the consultancy firms are trying to carve a niche without having everybody focusing on KM.

Wilson (2002) stated that since 1993, Bain and Company have been tracking the use of management tools. In the 2000 survey, 35 percent of the worldwide sample of 451 companies that use KM, it achieved a 3.5 out of 5-point satisfaction level. Out of the 25 management tools used, KM sits on the 19th position. Bain survey, according to Wilson (2002), suggested that KM flood may be more than a trickle.

5 Company (ExxonMobil) profile

For the topics above, we have seen how academics and consultants view KM. From this point onwards, I would like to use ExxonMobil (EM) as a case study to research how KM impacted the Information Technology (IT) functions. But first, a little background on ExxonMobil.

It all started as Standard Oil of New Jersey by John D. Rockefeller in 1865 (Yergin, 1991, 1992). Now, EM is the world's leading non-governmental energy company. There are currently 86,000 employees with 62 percent employed outside the United States. In 2004, it produced an average of 2.5 million barrels of oil and 9.8 billion cubic feet of gas daily, which respectively represents about three (3) percent of daily world oil demand and 3.5 percent of daily world gas demand. It has a worldwide refining capacity of 6.4 million barrels from 45 refineries, which represents eight (8) percent of the total worldwide refining capacity.

Fuels were sold at almost 40,000 service stations, provided aviation services to more than 600 airports and service vessels at 300 ports worldwide. It is the foremost supplier of lube basestocks (used as the base for refining oils) and a leading marketer of finished lubricants (an example is Mobil 1) and specialty products (such as while oils or waxes). Apart from petrol, EM's chemical products are sold in more than 150 countries with product ranges from shopping bags and plastic bottles to pipes and tires. Since the merger between Exxon (knows as Esso outside of the United States) and Mobil in 1999, it has returned more than US$57 billion to shareholders through dividends and share buybacks.

5.1 EM Information Technology (EMIT) structure

EM is organised in several businesses and departments. The IT department, called EMIT (Exxon Mobil Information Technology) is organised as a Global Business Services (GBS) Company. Apart from IT, Procurement, Real Estate and Facilities are also under the GBS umbrella. GBS provides services to the rest of the companies in EM.

Within EMIT, there are several business units. These are:

- **Upstream IT** – Acts as a single point contact integrating with the Upstream businesses to effectively and efficiently leverage on IT for Upstream business success. This business unit is centrally located in Houston, USA with various co-locations in other parts of the world which has upstream refining capacities.
- **Downstream IT** – Acts as a single point contact with the Downstream businesses, effectively and efficiently leveraging IT for Downstream business success. This business unit is co-located with the downstream business and other major IT sourcing locations.
- **Chemical and Corporate IT** – Acts as a single point contact with the Chemical and Corporate businesses, effectively and efficiently leveraging IT for Chemical's business success. This business unit is located primarily in Houston, USA with minor present in Brussels and Singapore for regional alignment and Dallas and Fairfax for corporate alignment.
- **Infrastructure and Applications** – To provide operational reliability, security, efficiency, functionality and responsiveness to EM's busines needs and for EMIT to be recognised as a strategic business partner with EM businesses. This is a strategic business unit which combines Infrastructure, SAS, BLA and Services Management.
- **Infrastructure** – Providing engineering and, technical and operations support and customer support services for computing and network

resources. It is located centrally in Houston and Dallas, USA with presence in nearly all geographies where ExxonMobil's business operate.

- **Business Line Applications (BLA)** – Provide IT business units and their client organisations effective and efficient application support services. This unit is globally distributed in 21 countries with majority presence in Canada, Thailand, Hungary, Brazil and US. Has strong focus on virtual teamwork.
- **SAP Application Support (SAS)** – Provide effective and efficient delivery and support for SAP applications systems for 45,000 globally distributed users. This unit is globally distributed in over 20 countries with the largest concentration in the US, Thailand, Singapore, Brazil, Hungary and Canada.
- **Projects** – Project Managers are assigned to specific Business IT for developing and executing project portfolio for their respective functions. Primarily located in Houston, it has co-locations in other parts of the world.
- **Data, Integration, Architecture and Learning (DIAL)** – The aim of this unit is to effectively and efficiently extract data, information and knowledge assets from long term information technology direction, streamlining data and information utilisation, improve efficiency of global work processes, aligning IT system designs, priorities and deliverables with business priorities and requirements. The team is globally distributed.
- **Planning and Support** – This unit plans and budgets the annual IT expenditure, involve in financial and operating stewardship, reporting of key performance indicators (KPIs) and other scorecard measures. The team is globally distributed.

All of these business units are headed by the Vice President of EMIT (VP), Pat Hewlett. EMIT has always been media shy until recently with the EMIT VP granted an interview with CIO Today. This is what she has to say (see Appendix B for a copy of the interview):

"Success in our business requires performance over long time frames, and it's our people who will drive successful innovation over the long term."
--Pat Hewlett CIO Today Interview, 17 January 2006

Part of this interview was the focus on knowledge management and organisational learning to attract and retain high-quality and globally diverse workforce.

5.2 EMIT mission, vision

These are the key principles of EMIT:

VISION

Our vision is to be recognized internally as a strategic partner of ExxonMobil's businesses in leveraging information technology for business success, and externally as the undisputed industry leader in IT integration in enabling business success.

MISSION

Our mission is to provide, through partnership with our client organizations, effective and efficient information technology that enables the success of ExxonMobil.

PRINCIPLES

Effectiveness:

- Information technology is a distinguishing capability of ExxonMobil, adding value through the integration of information technology services with business processes.
- Partnership with client organizations throughout the IT solution life cycle is key to success.

Efficiency:

- *Global, common* and *standard* solutions are the basis of efficient IT service delivery.
- Strategies such as *standardization, consolidation, automation* and *cost-effective sourcing* deliver reliable and secure IT services at the lowest unit cost.

People:

- ExxonMobil IT people have diverse professional backgrounds enabling them to rotate between the business and IT organizations.

6 ERP process teams of EMIT

Turning back the clock to the merger of Exxon and Mobil in 1999-2000, there were three IT organisations supporting EM's businesses. The three organisations were: (1) Upstream Technology Center (UTC), (2) Upstream Technical Centre (UTeC) and (3) Global Information Services (GIS).

UTC provides geosciences and engineering applications, technical data management and user support for the Upstream business. On the other hand, UTeC provides the related technical computing infrastructure for the Upstream, and GIS, provides business applications and general purpose infrastructure for the remainder of the Corporation. Sometime after the merger, the upper management recognised significant demands and reliance for each of the group. A synergies study was conducted and ended in 2004. It concluded that there are indeed opportunities to align the three groups. In March 2006, the vision and roadmap was achieved by merging all three strategic business units into one called ExxonMobil Information Technologies (EMIT). It is a new beginning of a journey to integrate the IT service delivery to further exploit synergistic opportunities going forward and fully capture the associated benefits for EM.

How does this realignment effect knowledge management within EMIT?

I would like to address the question by basing on a particular group. This is the ERP group under the SAS umbrella. This group provides end-to-end operation support, maintenance, program enhancement, technical support, integrating SAP services with other ERPs, as well as security and controls. This unit is further divided into four sub-units:

- **Downstream –** supports downstream activities
- **Upstream –** supports upstream activities

- **Chemical –** supports chemical function
- **Corporate Services –** supports Human Resources (HR) function

SAS' customers are all internal, covering businesses and support functions that use enterprise-wide SAP services. With a global team that spans over 20 countries, with each location catered to the local business needs, this group requires strong focus on virtual teamwork.

6.1 Virtual teams formation, the pros and cons

Traditionally, workers are arranged in work teams, divided by organisational structures or according to project, profile and function. Today, the new model of knowledge work teams or work groups is more varied, distributed, dynamic and autonomous (Hamid, 2003). For most multi-national corporation, globalisation is the key word of the millennium. With globalisation, it created far-flung teams in every corner of the world. These teams are called virtual teams. Virtual teams are groups of people who primarily interact electronically and may meet face-to-face occasionally (Gould, 2005). People who works (in a group of two to twenty-five people) at different geographic sites or people who telecommute are examples of virtual teams.

There are various reasons for the sprouting of virtual teams. It could be that the team members are physically located in an area, or it may not be cost effective to travel and meet face-to-face or perhaps the reason may be that team members may be working on different shifts.

Malhotra (1997) said that the key objective of the virtual organisation is to cater to maximal agility: provide anything, anytime, anywhere, anyhow. According to David Gould's article (2005), teams may be distributed because of the new realities facing organisations such as:

- organisation-wide projects or initiatives
- alliances with different organisations, some of which may be in other countries
- mergers and acquisitions
- emerging markets in different geographic locations
- the desire of many people and government organisations for telecommuting
- the continuing need for business travel and information and communications technologies available to support this travel
- a need to reduce costs
- a need to reduce time-to-market or cycle time in general (the increasing velocity in business)

We now know the reasons for having virtual teams in the organisation. The question lies in how does the team communicate and share information? This is where technology comes into play. In EM, virtual teams are support by both hardware and software. General hardware usages are like telephones, personal desktop computers or notebooks, cable modem, mobile phones, black berries or equivalent and local and wide area networks. Software usages include groupware product such as electronic mail (e-mail) like Lotus Notes or Microsoft Outlook, telephone conference call facilitation, common file sharing services, instant chat and group time management system.

Show below is an example of a typical virtual conference call. The process of setting up a meeting is illustrated in a step-by-step manner.

Step 1: Locate the geographical position of the attendees. Special attention is paid to the working and sometimes the waking hours of the participants. If the meeting consists of attendees from Asia Pacific and America, it is very likely that the meeting will be conducted after office hours. Considerable understanding must be exercised due to the personal sacrifices of working after office hours. One very good tool used by

the EM community to determine the best timing for holding virtual meetings is TimeandDate.com website (see Figure 9). You are given a choice to select countries you have to work with. This website tells you the time of each selected location.

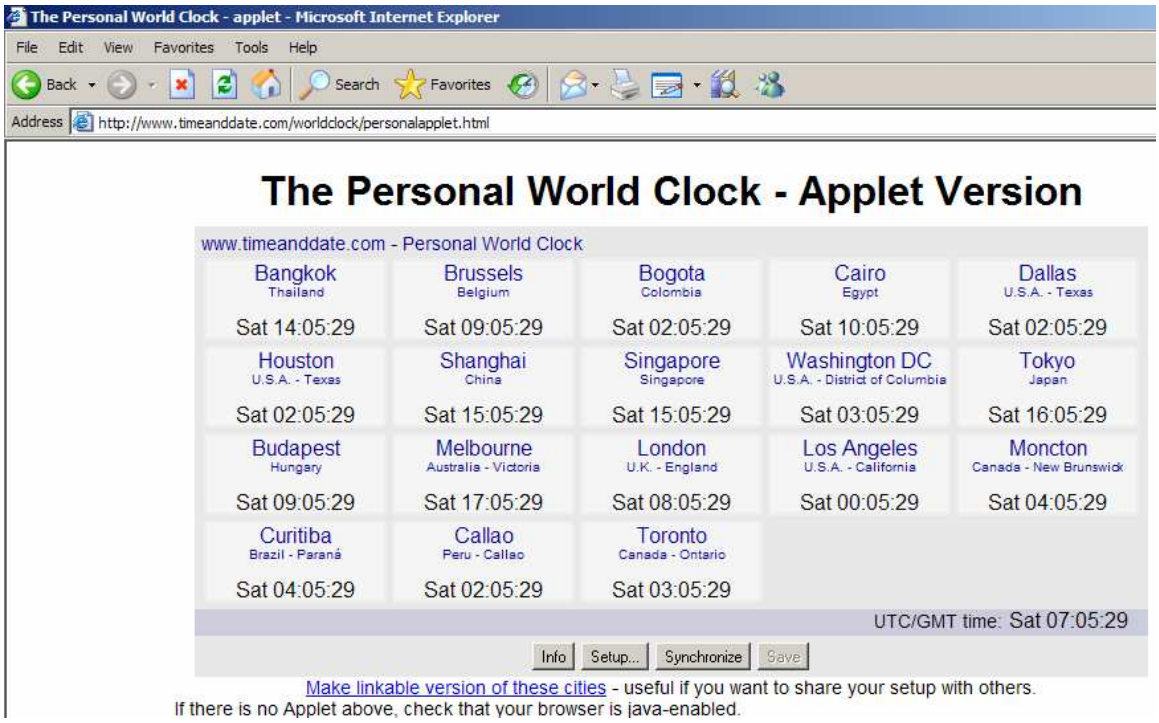


Figure 9: Lim Geok Chien's Personalised World Clock
Source: www.timeanddate.com, 26 August 2006

Step 2: Invite the attendees via Lotus Notes meeting planner. This is an ideal tool as it helps the planner keep track of the attendants. The meeting planner also translates the meeting time into each attendant's local time.

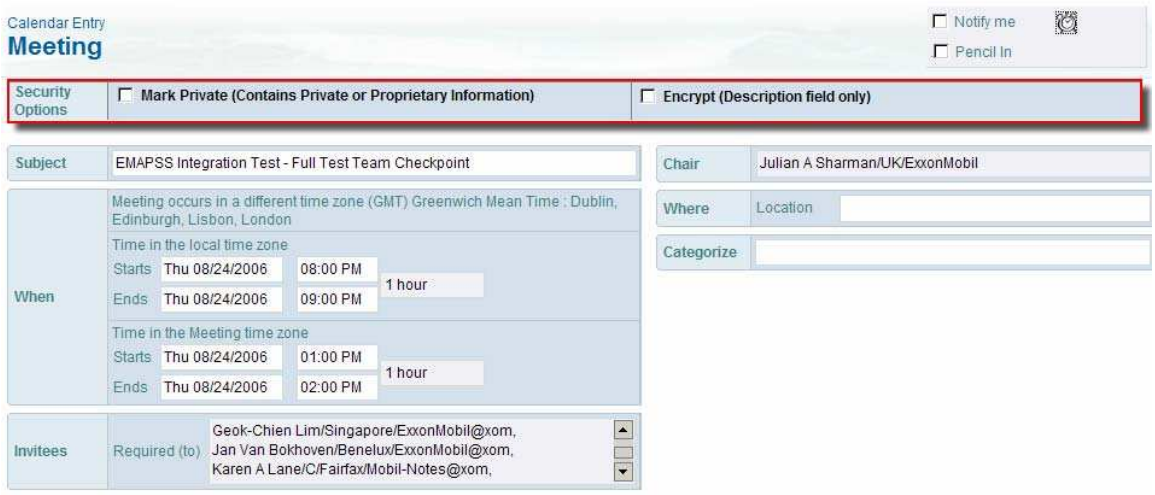


Figure 10: Lotus Notes meeting planner, note that local time shows Singapore time and the meeting time zone occurs in London (GMT)

Source: ExxonMobil IT, 2006

Step 3: A conference call facilities is setup. The information is disseminated to all participants to call in at the arranged time.

Conference Information
Confirmation Number: 122330
Conference Frequency: One-time
Host: Julian A Sharman
Date of Conference: 08/24/2006
Time (Central Time Zone): 07:00AM - 08:00AM (Houston/Bogota) , 08:00AM-09:00AM (FFX), 14.00-15.00 (Brussels) , 20:00-21:00 (Singapore)
Enter/Exit Notification: TonesDefault
Number of Ports: 12
Please note: Your Audio Conference will automatically increase the number of ports and extend time as needed

Attendee Passcode: 9987654
Moderator Passcode: 2234451
Please ensure that you press the # key after inputting the passcode

Dial-in Numbers
Local Houston Calls/International Calls or Long Distance from Company locations: 713-900-5000
Toll-Free calls from Non company Locations: 800-800-8000

For assistance during a conference call, press *0 and you will be connected to an Audio Conference Operator.

Figure 11: Conference call facilities (phone numbers have been changed)

Source: ExxonMobil IT, 2006

Step 4: The meeting is conducted via two medium, voice and computer. The participant will call into the pre-setup conference line. After which, the personal computer (desktop or laptop) which must be connected to the ExxonMobil LAN will be used to share information. This is done via a software application called, NetMeeting. NetMeeting enables everyone to look at each other's computer screen.

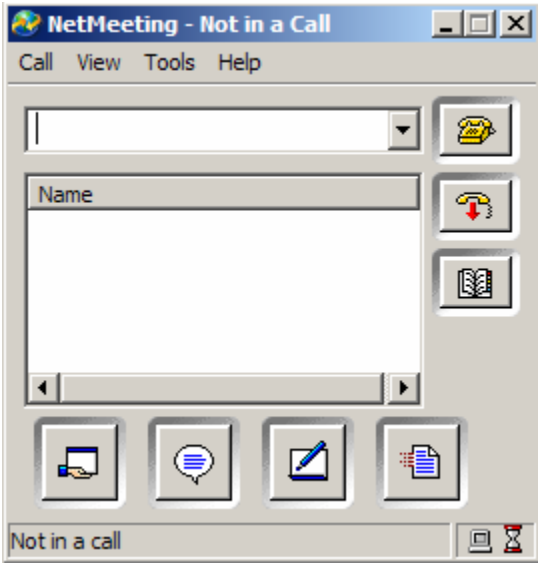


Figure 12: NetMeeting application
Source: ExxonMobil IT, 2006

From the above example, holding a virtual team meeting is no mean feat. There must be some benefits of having virtual teams. The following lists some of the pros:

- Work place flexibility as people can work from anywhere at anytime.
- Employees are recruited for their competencies, not based on physical location.
- Employees with physical handicaps would not pose a problem.
- Expenses associated with travel, lodging, parking, and leasing or owning a building may be reduced and sometimes eliminated.
- Employees save on commute time.

- Employees may feel less effect of organisation hierarchy.

As always, there are both sides to a coin. Although virtual team has many benefits, listed below are some of the disadvantages:

- Strong will-power is needed to work from home.
- There is no team-bonding as each employee works independently.
- A typical workplace syndrome, out-of-sight, out-of-mind. The employee may miss out on other great opportunities.
- Difficult to strive for a work-life balance as the line between home and work place blurs.
- Manager/supervisor and employee may not have mutual trust.
- Absence of body language and facial expressions.

6.2 KM in EMIT

The section above tells us that SAS operates as a virtual organisation. Let us do a quick run through of how EMIT sees KM. Figure 13 below depicts the EMIT change timeline.

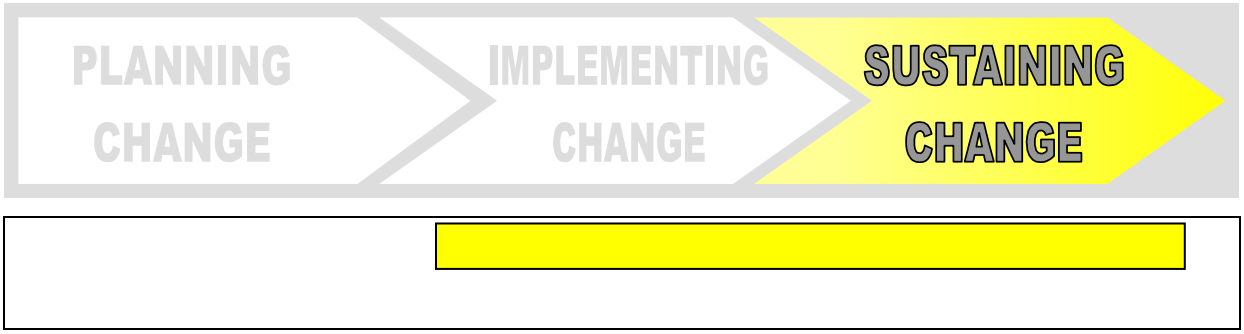


Figure 13: ExxonMobil Change Timeline

Source: ExxonMobil IT, Retaining and Managing knowledge, 2005

According to EMIT, the loss of knowledge is most likely to occur as the change gets underway and people change their positions or leave the company (denoted by the yellow bar in Figure 13).
An organisation never stands still. EMIT will change and that frequently bring with it a change of positions and jobs. People leave their current positions, new positions are created, and some people may leave the company. With this change comes the risk of a loss of knowledge.

According to EM, corporate knowledge consists of:

- books
- patents
- best practices
- manuals
- employees
- files
- databases

Retaining critical knowledge becomes an issue because it can be lost not only when employees leave, but also when they change jobs. Both these events accelerate during change. The American Productivity and Quality Center (APQC) supports this position in their study entitled “Retaining Valuable Knowledge: Proactive Strategies to Deal with a Shifting Workforce."

When talking about knowledge in the context of change it is important to distinguish between explicit and tacit knowledge. In the broadest terms explicit knowledge can be written down and processed by information systems. It can be codified, recorded, archived and protected by the organisation. Tacit knowledge exists in people's heads. Tacit knowledge is extremely difficult to transfer; explicit knowledge is easier, and this is the crux of the problem in organisational change.

The difference between tacit and explicit knowledge also determines who owns the knowledge. Explicit knowledge is most likely the property of the firm. Since tacit knowledge cannot be codified, it effectively remains the property of the knowledge worker. While they are employed by the company knowledge workers are ethically--and sometimes contractually--prohibited from sharing their knowledge with competitors. But if the knowledge worker leaves the firm, they would take that knowledge and its inherent value with them.

A well-planned change, based on a thorough risk assessment will have addressed the issue of getting the data people need to run their business to them. It will also have considered issues of data integrity, to ensure that the data people get is complete and accurate. Control and access to data will also be addressed to ensure that the right people get what they need, and that others do not. Data is NOT what knowledge management is primarily concerned with.

6.3 Reasons for KM

EM's knowledge assets start with "transactional" data related to our processes, projects, customers and vendors. On top of that, we add all of the research logs, patents, trademarks, marketing strategies and business plans. It also must include the competitive insights accumulated by every employee, and the competitive intelligence available from various sources. Finally to the top layer, add in the knowledge contained in every email, every Word document, every spreadsheet and every fax.

When we ask senior managers, does your change plan address all these resources? The most probable answer is that it does not. Yet those things still account for only a fraction of the real value of the knowledge assets. As much as 90 percent, (EM estimation) of the real value of intellectual capital is in the heads of our knowledge workers: their skills, experience, hard-won insight and intuition, and the trust they have

invested and earned in relationships inside and outside of the organisation. This knowledge is even harder to evaluate, share and leverage, let alone “manage”.

There are essentially three types of knowledge; (1) Cultural knowledge that people need to get things done in the organisation, (2) historical knowledge that provides context and understanding for today’s situations, and (3) functional knowledge involving technical, process, project, and client information. There are numerous ways to identify what knowledge is critical, and they all begin with understanding the flow of knowledge in the organisation. Approaches to tackling this task include:

• Senior Management discussions • Interviews with employees changing roles • Interviews with subject matter experts (SME’s) • Utilising Communities of Practice • Focus groups • Front-Line Supervisor interviews • Using data based on employee tenure, and turnover	• Staffing model projections • Exit interviews (for employees leaving the company) • Projected retirement dates • Industry analysis / demographics • External consultant evaluation

Figure 14: Flow of knowledge management
Source: ExxonMobil IT, Retaining and Managing knowledge, 2005

EMIT defines knowledge management as a systematic process of connecting people to people, and people to the knowledge and information they need to effectively act and create new knowledge.

KM is about getting the "right information to the right people at the right time in the right format and at the right cost".

~ Judy L. Schuler, ExxonMobil IT,
SAP Application Support Manager, 20 July 2006.

Over the past couple of years, with the expansion of EM staffing around the globe, the organisation is faced with many new challenges. Not only is EM confronted with the challenges of operating in a multicultural environment, but it is also experiencing, first hand, what it means to truly work globally and remotely. To help addressed some of the complexities; EM especially the SAS group has begun a focussed effort around KM.

The goal of a knowledge management initiative is to enhance the performance of the organisation and the people in it through the identification, capture, validation, and transfer of knowledge. The goal is not to share knowledge for its own sake, although that is a valuable by-product of the process. The expected outcome which benefits the organisation will be as follows:

- Innovation through the sharing of knowledge between divisions
- Smoother job transitions (both local and global)
- Enhanced knowledge transfer, both short and long term
- Improved customer service through faster problem resolutions
- Improved productivity and performance

For EM, KM cannot work without all three:

- processes
- behaviour
- technology

There is also another reason for having KM. Susannah Patton (2006) in her article of KM said that the oldest baby boomers are six years away from retirement. The situation would not be faced with a dire situation that thousands of knowledge workers retire, but the organisation must faced up to the reality of the greying population. Patton also mentioned that by 2010, more than half of all workers in the United States will be over 40. As of 2005, the baby boomers (the generation born after World War II) range in age from 41 to 59, and their numbers almost double the Generation X that follows them. Leonard (2005) professor emerita of business administration at Harvard Business School provided the example that if an experienced scientist plans to retire in a year, the pharmaceutical company where he works should have a younger researcher shadow the scientist and work side by side. This is done not only to learn the facts but also the method of diagnostics.

> *"Companies need to figure out who has the important knowledge, and they need to capture it before it's too late. If they don't, they'll be paying to reinvent the wheel."*
> *~ Carl Frappaolo, cofounder of consultancy Delphi Group.*

Management is aware of the issue and turn to KM to help retain crucial knowledge. Succession planning or the use of talent management software can provide organisations with a good view of who is working for who, how is their performance and how long will they be around to work for the company. Planning ahead is not a "need" but a "must" that must be done right now. Scott Shaffar, director of Northrop Grumman said that "There have always been new generations, and we're not any different in that way. Mentoring, training and passing on knowledge is not something you can do at the last minute. You have to plan ahead. In an exit interview, you can capture certain things, but not a lifetime of experience." (Patton, 2006)

6.4 Challenges of KM in EMIT

There are three ways to avoid immediate loss of knowledge during a change (see Figure 15). First and foremost, perform one of the easiest but most overlooked things in the organisation's plan, which is to protect valuable knowledge and to have a sound "hand-over" process. This process would not address the transferring of tacit knowledge of the employee but at least it provided the organisation with a framework for the incoming employee to affect an orderly transfer of activities (see Appendix C for EM's SAP knowledge management evaluation list).

The second item is to consider a specific plan to address and retain key employees. The identification of key players must include KM issues.

The third way is to look into managing knowledge over the long run, which includes processes and systems to acquire tacit knowledge, convert that knowledge into explicit knowledge (documentation is the most viable avenue), deploy it as a “best practice” and maintain it until it is supplanted.

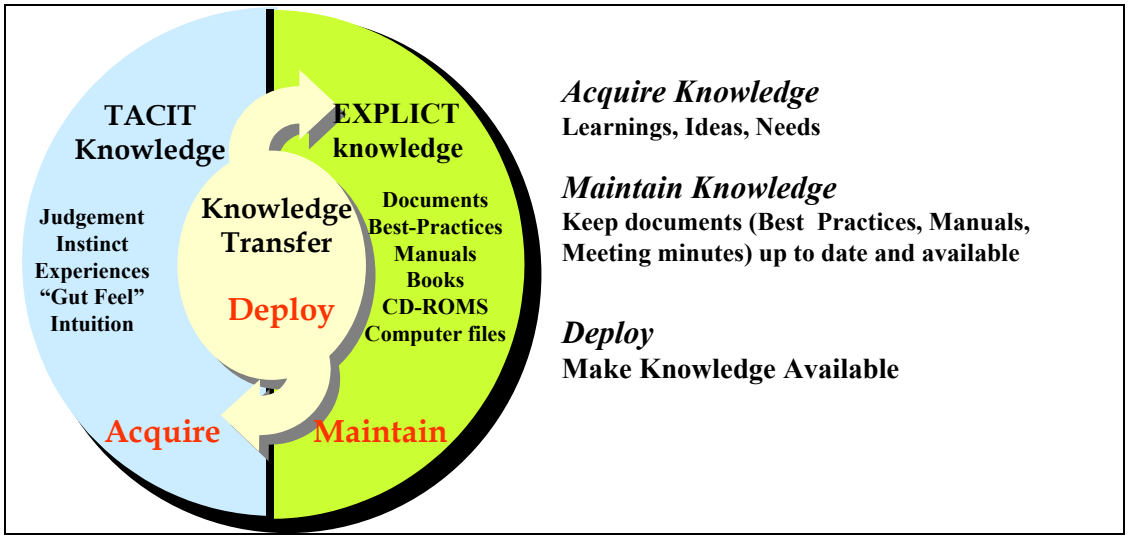


Figure 15: Acquisition, Maintaining and Deploying knowledge

Source: ExxonMobil IT, Retaining and Managing knowledge, 2005

This process requires thought and design, including, IT investment, to be done properly. However there are elements that can be implemented to improve knowledge retention and organisational learning without heavy investment. These elements include establishing an environment that fosters the formation of virtual teams, and networks. EMIT addressed KM using various approaches, among them:

To Capture Tacit Knowledge	To Capture Explicit Knowledge	To Transfer Knowledge
• Networking • Documentation • Project Milestone Reviews • Communities of Practice • After Action Reviews	• Collaborative tools, especially when integrated into the employee's workflow • Document Management Systems • Team databases (via LAN share or Lotus Notes database share) • Issues systems • Decision support systems	• Communities of Practice • Face-to-face team or department meetings • E-mail • One-on-one expert consultation • Apprenticeship programs

Figure 16: Capturing and transferring of knowledge

Source: ExxonMobil IT, Retaining and Managing knowledge, 2005

Apart from the three ways written above, EMIT can consider development a knowledge map. A knowledge map is like a "Yellow Pages" directory which is constructed to guide knowledge workers on where to seek out the best knowledgeable person. According to Davenport (2000), developing knowledge map requires in-depth knowledge of locating important knowledge in the organisation and then lists it down to show where to find it. Just like a map which shows the location of various landmarks, roads and rivers, knowledge map is a picture of what actually existed and where it is located in the company and how to find it. However, knowledge map is not an organisation. Most

organisational charts are hierarchical describing reporting structure. It rarely tells workers where people find knowledge. Effective knowledge seekers normally cross departmental boundaries and ignore reporting structures to get what they need.

It is also important to note that organisations are dynamic. Knowledge maps can quickly get out of date. Continuous up keeping of such maps is essential. EMIT can make use of Lotus Notes or its Intranet browser to publish such maps. The challenge to EMIT is to try to steer away from the political implication. It is not easy to pinpoint who have the knowledge. Those who have it are recognised and rewarded then the map will reflect a chart of status and success. Another area of concern is that not everyone wants to share their knowledge. It is viewed that sharing knowledge is as good as giving away power and influence.

6.4.1 Kinds of Knowledge Transfer

What are the strategies for organisation to transfer knowledge effectively? One way is to hire smart people and let them communicate with each other. But how do we ensure they communicate well?

There are two types of knowledge transfer in EMIT. The unofficial knowledge transfer would be like asking a colleague how to put together a project plan/timeline or asking to explain some programming codes. The official one would be like job handover from one out-going employee to another. Or it could be work shadowing for off-shore work or through a consultant.

Figure 17 below which shows an official example in EMIT of how knowledge can be shared across boundaries. The author (an EM employee) had a good idea on how to reduce wait time while opening files which sits half-way across the globe. A document is created and disseminated to all IT EM personnel.

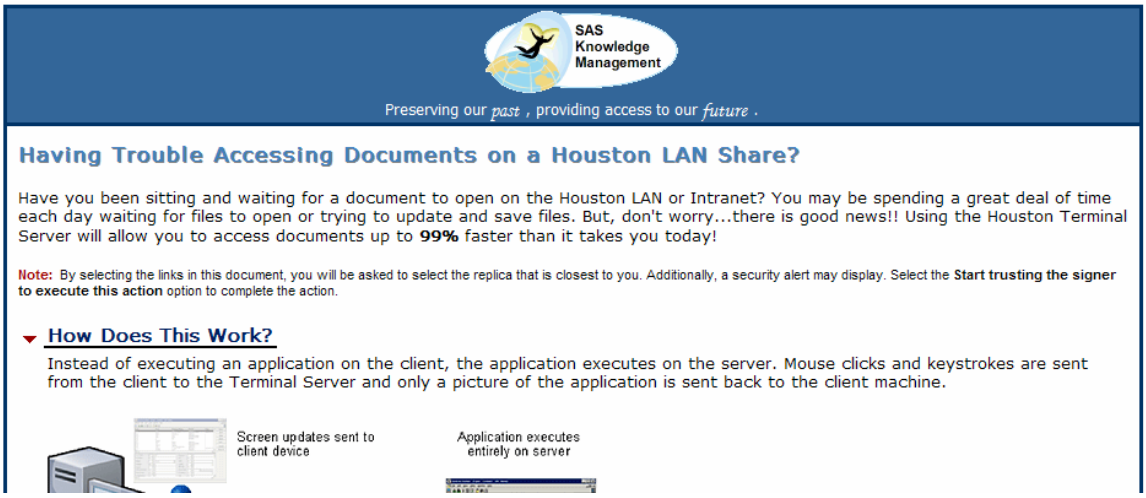


Figure 17: EMIT example on sharing knowledge

Source: Matt Mitchell, SAP Basis, ExxonMobil IT, 3 August 2006.

One of the best ways of seeking knowledge is from conversations at the water cooler, coffee maker or vending machine. Management sometimes assume that socialising by the water cooler is a waste of time (Davenport, 2000). Although some of the talk would be on social/personal basis, but people do ask each other about their work, projects, or how to solve problems. Advices are normally given on the spot, and ideas were bounced off each other.

"In a knowledge-driven economy, talk is real work."

~ Davenport, 2006

At EMIT, transferring of knowledge via personal conversation is facing threat from virtual offices. A few departments are already home-based. Others have virtual group around the world. Most of the conversations are conducted over the phone or on the computer across company-wide network (see section 7.1 above on virtual teams formation).

6.4.2 Using culture to capture tacit knowledge

As discussed above, it is important to capture and transfer knowledge before it is lost forever. Such knowledge are embedded in procedures or documented in reports or databases. Tacit knowledge transfer requires a lot of personal interaction. The "transfer of knowledge relationship" may be in a form of partnership (in a team), mentoring or apprenticeship.

One effective way of capturing tacit knowledge is by making use of company culture. Morgan (1986) believed that culture is a series of metaphors developed for understanding how organisations work. On the other side of the coin, Pacanowsky and O'Donnell-Trujillo (1982) thought that culture featured an organisation's systems, policies, procedures and processes. In contrast, Schein (1985) suggested that culture is best portrayed as a set of 'basic assumptions' that members of an organisation possess, which leads them to think and act in certain ways. The definition of organisational culture adopted from Andrew Brown (p. 9, 1998) is as follows:

> *"Organisational culture refers to the pattern of beliefs, values and learned ways of coping with experience that have developed during the course of an organisation's history, and which tend to be manifested in its material arrangements and in the behaviours of its members."*

As young children, we listen to stories of our parents and grandparents' time. These fables teach us moral and values. Such idea does not change for adults. Human beings learn best from stories. Karl Weick says, "People think narratively rather than argumentatively or paradigmatically." (Davenport, 2000)

According to Denning (2001), completeness of communication is not necessary. The overriding goal of this particular kind of communication is to generate the listener's mind a big-picture idea that will strike the listener not only as fresh but also as self-

generated, so that it will become part of the way in which the listeners will identify with the organisation they work with. Therefore, the story that rings true can be a useful tool.

Using stories to embed experience is a good way of transferring tacit knowledge into explicit knowledge. Kleiner and Roth (1997) wrote that experience can be the best teacher, in both the individual and organisational lives. In this way, meaningful messages/knowledge can be conveyed. Firms emulate this by sending copies of videos and showing them over lunch time or in a staff meeting. Once knowledge is delivered with feeling and is placed in a context that is acceptable by the audience, it is very likely to be absorbed and adheres to listeners' sense. Verifone (acquired by Hewlett-Packard) has workers around the world. Stories of desirable business behaviour are circulated electronically under the banner of "Excellence in Action". (Davenport, 2000).

Similarly for EMIT, information are posted on the intranet for employees to peruse on their own time. An example is the ***EMIT Teams Without Borders*** intranet-site (see picture on the right). This site has links to equip EMIT employees on being a good contributor/player in virtual teams, people managing skills, cultural awareness, a mini-forum on knowledge sharing and many more.

Source: EMIT Intranet

Apart from using the internet/intranet, the rest of the information are either in Word document format, PowerPoint presentation or video (see Figure 18 for an example of a multimedia presentation).

Figure 18: Messages are transmitted via video streaming across EMIT intranet
Source: ExxonMobil IT, "Meet Pat Hewlett", 23 February, 2006

Using video recording or cutting a CD-ROM to store knowledge before an employee leaves the project team, department or the company is a good way of retaining knowledge. As a rule of thumb, the richer the tacit knowledge, the more technology should be used to capture it. Explicit knowledge can be easily contain in a database or documented. But tacit knowledge should be creatively captured with the tools offered in the current market to better capture it. These are done to ensure a successful knowledge transfer.

6.4.3 Challenges of knowledge transfer

There are many factors that may prevent knowledge transfer. Davenport (2000) listed some of the most common frictions and ways of overcoming these inhibitions.

Friction	Possible Solutions
• Lack of trust	• Build relationships and trust through face-to-face meetings
• Different cultures, vocabularies, frames of reference	• Create common ground through education, discussion, publications, teaming, job rotation
• Lack of time and meeting places; narrow idea of productive work	• Establish times and places for knowledge transfers; fairs, talk rooms, conference reports
• Status and rewards go to knowledge owners	• Evaluate performance and provide incentives based on sharing
• Lack of absorptive capacity in recipients	• Educate employees for flexibility; provide time for learning; hire for openness to ideas
• Belief that knowledge is prerogative of particular groups, not-in-vented-here syndrome	• Encourage non-hierarchical approach to knowledge; quality of ideas more important than status of source
• Intolerance for mistakes or need for help	• Accept and reward creative errors and collaborations; no loss of status from not knowing everything

Figure 19: Some challenges of knowledge management

Source: Davenport, (2000), *Working Knowledge*, pp. 96-97.

Language is the most important medium of knowledge transfer. This is one of the critical success factors. Brought together, these employees will clash and not have a

connection. This emphasizes on Nonaka and Takeuchi's "redundancy" areas of expertise.

"People can't share knowledge if they don't speak a common language."
~ Davenport, 2006

Knowledge transfer is more effective if various parties are brought together physically. Davenport illustrated an example of tunnelers in New Zealand who developed an innovative improvement on a particular drilling process. The executives want this to be emulated in Boston (USA). Knowledge were then transfer via memorandums, documents (descriptions and diagrams) even hiring a consultant to talk to the crew in Boston. Nothing worked! Finally, the two drilling teams were brought together and by spending time together, the knowledge was transferred, absorbed and used by the Bostonians.

"Transfer = Transmission + Absorption (and Use)"

This shows that tacit knowledge is much harder to transfer. Therefore, sometimes, there is no substitute for direct contact.

7 Interviewing EMIT ERP process team

The focus of this research paper is to identify how knowledge used and the barriers to knowledge sharing in ExxonMobil Information Technology (EMIT) global ERP teams.

I have decided to use some of the frameworks from Nonaka, Davenport and Malhotra and devised my own framework. This is the combined framework:

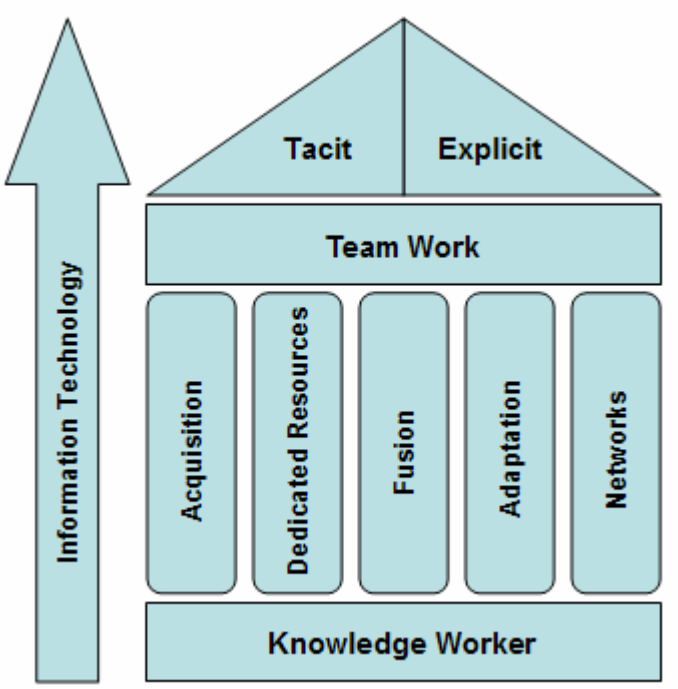


Figure 20: Combined KM framework

The framework is designed like a home, whereby a home requires a strong foundation. The foundation of KM is the people – the employees, the workers. These employees will develop and tap into Davenport's five values which are; acquisition, dedicated resources, fusion, adaptation and networks (please refer to Figure 7 for explanation on these five values). These 5 pillars will provide support for team work. With the interaction of employees in a team (be it a physical or a virtual project team or a department division), it will foster exchange of knowledge. This exchange will be the

breeding ground for the development of tacit and explicit knowledge. It is this knowledge (tacit – explicit) which provides "shelter" for the organisation – for the organisation to continue to work as one (under one roof). On the left of the "house" is an arrow that points to the sky. This arrow represents a tree. This is a healthy, growing tree that provides shade to the house. Thus, it aids the growing influence of KM through the use of Information Technology.

Based on the combined framework, a couple of questions were drafted for the EMIT employees. These are the questions:

(1) How effective is the sharing and transfer of knowledge from tacit to explicit in your team?
(2) How has in-sourcing affect knowledge transfer?
(3) Are virtual teams efficient at sharing knowledge?
(4) What are the challenges of working in a virtual team/environment?

7.1 Scope and Methodology

I am interested in investigating the impact of knowledge management and utilisation in EMIT. I have decided to focus this research on a sub-set of EMIT – the SAP Basis process teams. The scope of the research is not to focus on the SAP KM module (the actual ERP software application), but rather on the EM's KM process.

This boils down to which type of research to use. I have narrowed down to two choices, conducting a survey via questionnaire or an interview. If the use of questionnaire is employed, it will have to be anonymous. EM has a standard survey tool which is available on the intranet to all EM employees. The tool contains all the features needed to create a survey form with open ended questions and/or closed questions. The beauty of this survey tool is that it protects the identity of the person taking the survey. After designing the questionnaire, I felt that it did not meet the purpose of the study. The research topic is an exploratory one. Therefore, it is quite

challenging to devise questions, especially close-ended ones that are not ambiguous. After researching on the two types of survey, I have decided to lean more towards the interviewing strategy. The data is much easier to collect with face-to-face interview. Such oral survey is more personal and it will help me gather opinions and impressions from the respondents.

The interview was conducted over a span of two months, in the month of May and June of 2006. A total of twenty candidates were interviewed. Mostly are administered via a one-to-one sessions and one interview was conducted in a group of two. The one-to-one session was conducted via face-to-face (thanks to business travel) and some through the telephone, due to geographical separation. These candidates can be divided into three zones, (i) Asia Pacific (AP), (ii) Europe, Africa and Middle East (EAME) and (iii) North and South America (NA and SA) zones. These zones are drawn accordingly to the 8-hour work force timeline per day. They all form a part of a logical group. The term used by EMIT is the "Follow-The-Sun" (FTS) process. Basically, the job will be performed or monitored by Asia Pacific (AP) during the AP time zone. After which, at around 3pm to 4pm AP time (Singapore time zone, 8-hour transition based on US's daylight savings), the job will be transferred/handed-over to the employees located in EAME and then to NA and/or SA. This is to ensure the continuity of critical job flow.

The following chart shows the number of candidates interviewed and the percentages.

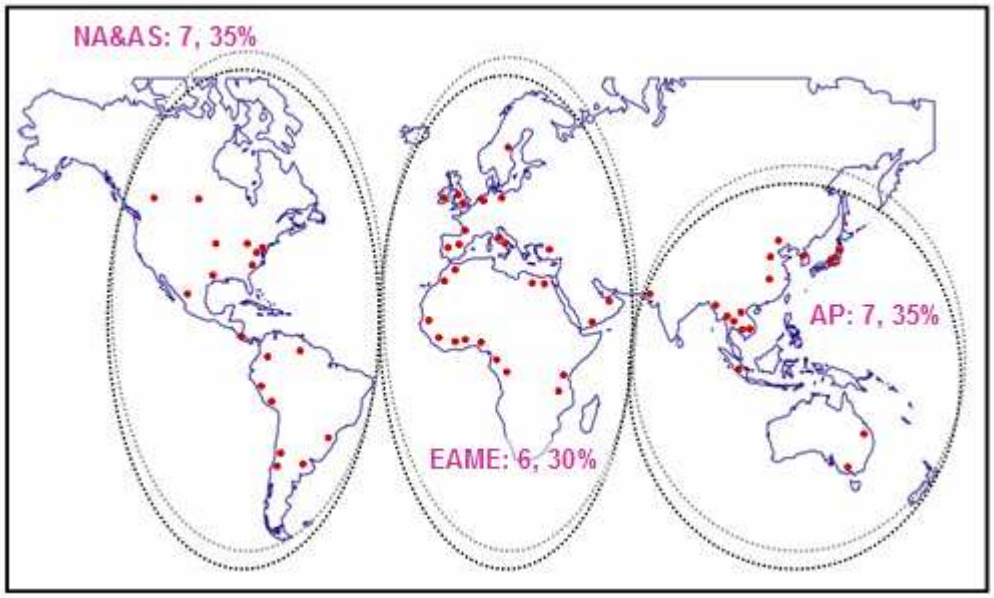


Figure 21: Participants from around the world based on the 3 FTS zones.

Figure 21 above shows the number (and percentages) of EM employees being interviewed across the different time zones. As you can see, it is equally distributed. The 20 participants represent about 10 percent of the total SAP Basis process team. The SAP Basis team has over 190 employees around the world.

7.2 Facts and Assumptions

These are a few key facts and assumptions to be noted:

1. All candidates are full-time employees of ExxonMobil. Contractors, consultants and student attachments were not part of the selection group.
2. Candidates were chosen randomly. Their working experience with ExxonMobil spanned from less than a year to more than 20 years of history. Years spent with other companies were not taken into account.
3. Management terms such as "explicit" or "tacit" were explained to candidates so that all of them have the common understanding of the terms used.

4. Candidates are guaranteed full anonymity.
5. All candidates are from the EMIT SAP Basis division.
6. All candidates were asked the same question.
7. We assume and trust that the candidates have answered the questions without deliberation.

7.3 Survey findings /learning

Listed here are the stated survey questions. Each question will be followed by a summary of answers from candidates interviewed that is further subdivided into three zones.

(1) How effective is the sharing and transfer of knowledge from tacit to explicit in your team?

AP

All candidates agreed that documentation is a good source of knowledge sharing but nothing beats having prior technical experience. For example, if the job requires the knowledge of Unix Operating System (O/S) or Oracle Sequel Query Language (SQL) skills, it would be easier for the out-going employee to handover jobs to the in-coming employee if the in-coming employee has some knowledge of these skills. The in-coming employee would be able to pickup the nature of the job (processes, etc.) much faster instead of concentrating on picking up technical skills.

Many IT experts in the AP region have prior SAP R2[19]. On the job training is a must as every problem or issue encountered will present a different scenario which documentation may not have captured it. A deep understanding of the system/application is vital.

[19] SAP R2 is termed as Release 2. Currently in EM, the version used is Release 3 (R3). R2 is not as user friendly as R3 as R3 has graphical user interface (GUI) as compared to R2 which uses/issues line commands.

It is important to make knowledge capture richer by using other means of communication such as video, CBT (computer based training via CDROM or the Intranet), work shadowing and so on. Work shadowing means having the employee from a different region working side-by-side with the local employees solving the same problem/issue. Both employees will be working together for a period of time, with the more experienced person passing on the knowledge to the least experienced person. The company acknowledged that tacit knowledge is not easily capture in documentation; therefore, actual hands-on work is more coveted.

EAME

Proper change management and documentation of processes are used for knowledge sharing. However, it was stressed that most of the documentations are out-dated. It is a challenge to document the work as there are hundreds of jobs to be taken care of and the jobs are dynamic. The employees find that more effort was spent on modifying programs and not much time was allocated to update the supporting documents.

Europe was the first place to have started implementing SAP R3 and the version was adopted by AP and NA/SA. Therefore, any codes changes to the application will initially be introduced in EAME. After much testing in EAME, the change will then be propagated to AP, NA and SA. Normally, there is a one month gap for each region's user acceptance test.

Being proactive is vital. Each IT person must have the motivation to seek out information, find the opportunity to learn from a buddy (or mentor) and try to have more interaction with the application users as well as with other IT personnel. The employee can do so by going through old documentation to try to understand how the application works. The project group that implemented EAME SAP had created very detailed documentation. However, the information uncovered can be quite basic. Armed with basic foundation, the employee can proceed to the next stage which is to seek external training for skills upgrading.

NA/SA

Tacit knowledge can be retained via good documentation. This can be done by following the EMIT standard documentation process. But problem may occur when most of the information are stored in the employee's head (explicit) and time is needed to transfer that into paper. This is a challenge as the IT person is pulled in many directions doing project as well as support work.

The scenario is slightly different in the "younger" area. There are the areas that IT has started to grow (via off-shoring) and the employees are younger and generally have less experience. Sometime back, in order to keep costs under control, there had been a worldwide exercise to consolidate (in-sourcing) support functions into a few concentrated areas. These areas termed as BSCs (Business Support Centers) were selected due to abundance of talent and lower operating cost. Something can be learned through documentation but nothing beats getting the hands dirty.

These are the results:

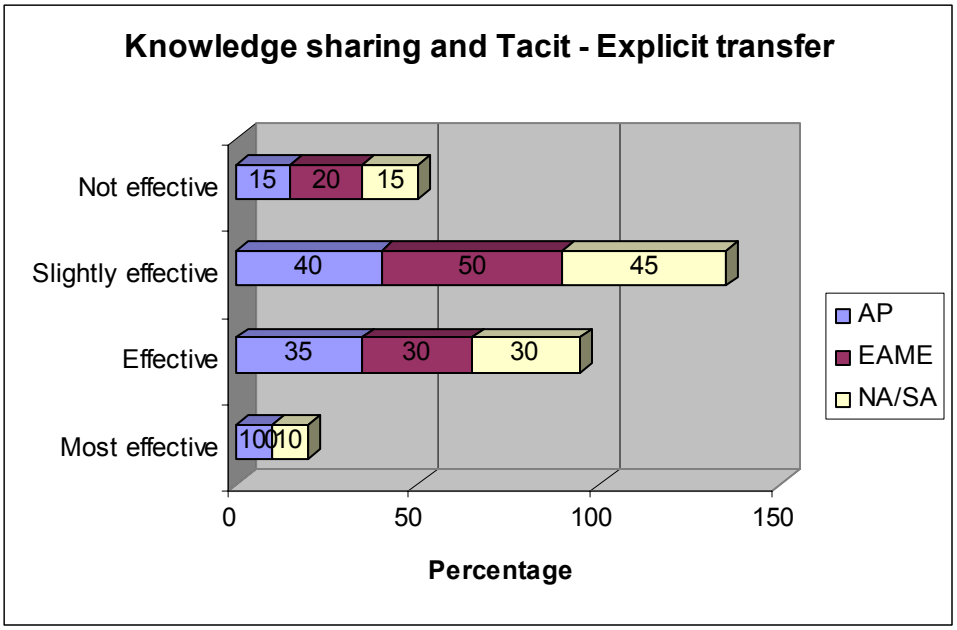


Figure 22: Individual zone results of sharing and transfer of knowledge (tacit to explicit).

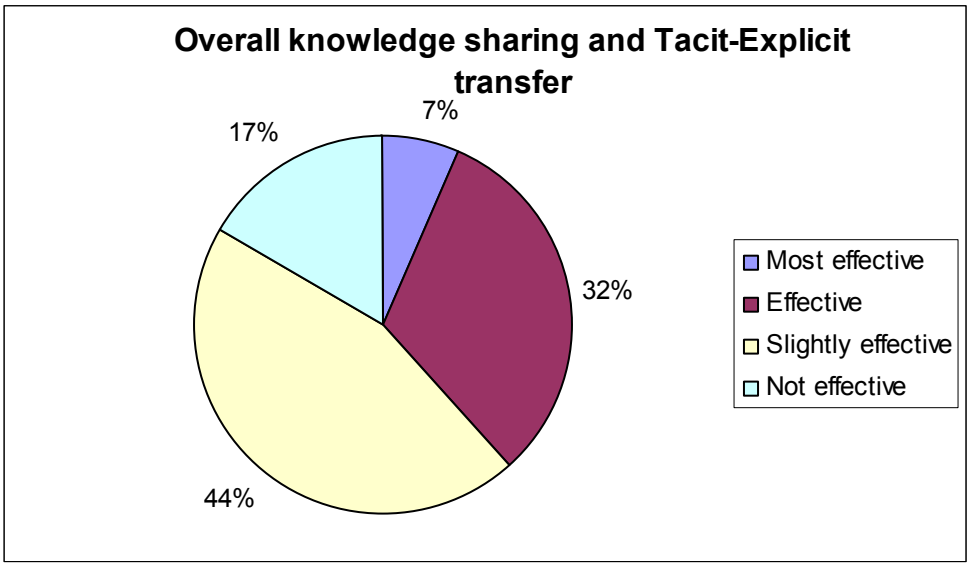


Figure 23: Total results of sharing and transfer of knowledge (tacit to explicit).

Figure 22 and 23 above shows how the employees feel about the exchange of work information and how effective is the exchange of conferring knowledge from one person to another. About two thirds of the respondents feel that it is quite effective – perhaps due to EMIT's stringent change management/handover process. But a total of 17 percent of the respondents feel that it is not effective at all. This may due to the nature of the job as some IT applications are easier to learn, while others may require slightly more time and effort to undertake such tasks. More than one person thought that it is not easy to replace knowledgeable technical person. According to a senior IT manager, the process of procreating one technical person takes about five to ten years. EMIT should think about how to prevent or minimise brain drain.

(2) How has in-sourcing affect knowledge transfer?

AP

In-sourcing within EMIT has helped a lot by moving manual day-to-day work to cheaper locations termed as BSCs such as North Asia, Eastern Europe, North and South America. Other types of more challenging work such as project management or other

work deemed tactical have replaced such work in AP. This is because the organisation realised that not all types of work can be transferred to BSC. Some types of work which is repetitive and is easily documented can be transferred. But other types of work which require more analysis and deeper understanding of the business (more experienced) needs to stay in a more mature (tactical) country, like Singapore.

BSCs face high turnover as experienced IT persons are very much in demand in such locations. The knowledge transferred from one employee to another tends to weaken overtime. Therefore, employees in mature locations travel frequently to BSC to train other employees.

EAME

For jobs that were moving from costlier location to less costly location, the experienced employees were given 6 months to a year to transfer knowledge to these employees in BSCs.

The environment in EAME is pretty much the same as AP with loss of knowledge due to attrition. At the moment the situation is under control. The employees in these BSCs are knowledgeable and they are able to train new employees. Much of the training are from documents handed-down from employee to employee, standardised computer-based training either on the CDRom or through the intranet. Employees are also sent to company approved trainers to gain more knowledge.

NA/SA

Cost is the main driver that work is being transferred to Canada, South America or other BSCs from the United States. But that does not stop the IT support work. Employees are facing different types of challenges as they are now working with the rest of the world. With globalisation, it is now tougher to work as the users are further away. More work are communicated via email and the telephone. The work hours are also longer especially for those having virtual teams in different time zones.

In some parts of the world, the department is shrinking. These employees voiced their concern that they may no longer be useful or needed (retrenchment?) after transferring the knowledge to others.

These are the results:

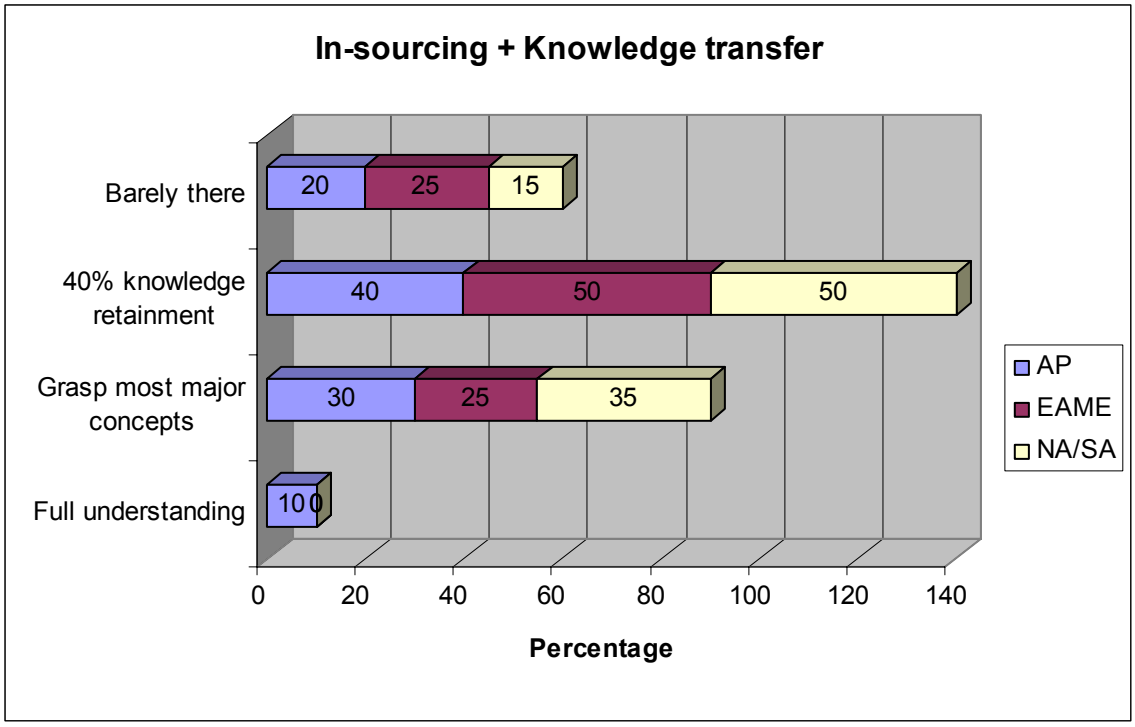


Figure 24: Individual zone results of in-sourcing effects on knowledge transfer.

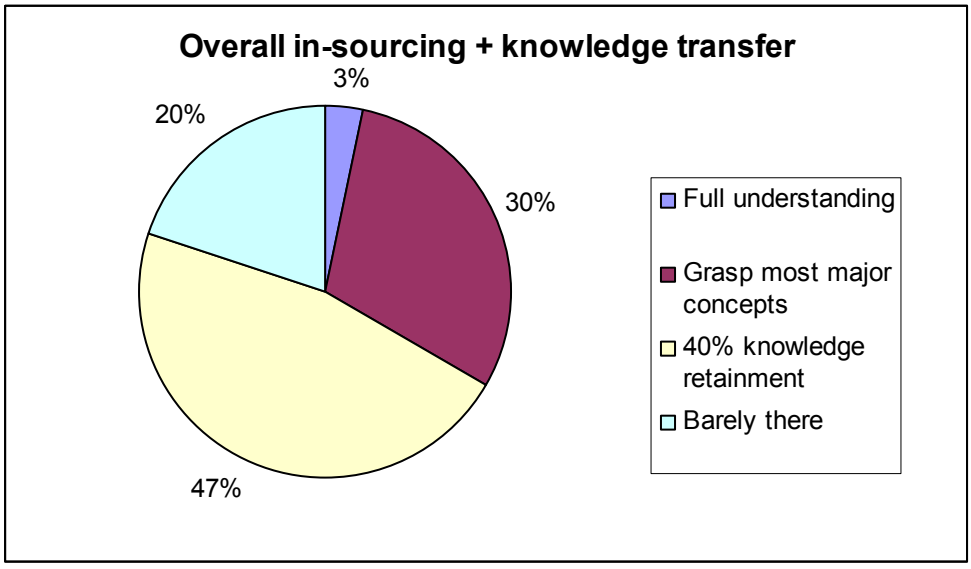


Figure 25: Total results of in-sourcing effects on knowledge transfer.

Figure 24 and 25 above show the result of how in-sourcing effects on KM. Nearly 80 percent have successful knowledge transfer and much information were retained. One-fifth or 20 percent of the respondents feel that the knowledge transfer is not effective at all. Perhaps, the transfer was performed via the telephone and documentation (word and powerpoint presentation). Another reason maybe due to job rotation or attrition that new employees are being offered the position make knowledge retention difficult. It would be better if the person is physically present to learn. Another reason given is due to time zone constraint. The employees may be located on the opposite side of the globe. While one person is awake, the other may be sleeping – which pose quite a challenge when it comes to sharing information.

(3) Are virtual teams efficient at sharing knowledge?

AP

The general answer is no. Instead of relying on "cold" communication, it would be more efficient to have a face-to-face talk or perhaps a call on the phone. That would erase much ambiguity resulting from depending on email communication. "Cold" communication is termed as communicating via a certain medium, either through voice,

video or e-mail/paper media. "Warm" communication is when both the sender and receive are present in the same room. Although voice and video can also be considered "luke-warm" as the both parties are able to feel or see the other party's body language.

Culture also plays a major role. The Westerners are easier to deal with but there are pockets of problems with Asians. If English is not the major language, not trained in school or not widely used, it is a problem. For example, some Thai users need documentation to be translated into Thai language as they do not have the command of the English language. Employees of EMIT are encourage to peruse a tool called Globesmart (see Appendix D for more information). Globesmart is an excellent resource as it compares the person with the rest of the world and provides guideline on bridging cultural gap.

EAME

Calling for meetings may be a challenge. Although EAME's time zone overlaps with NA, SA and AP, getting everyone onboard is difficult, especially those from Australia and New Zealand. Emails sometimes do get lost in-transit, not because the emails were not delivered, but because the recipients are too busy to read emails. Therefore, we tend the write emails as briefly as possible, but nothing compares to speaking to the other person in order to clarify their thoughts.

EMIT has a shared database either on Lotus Notes or the LAN drive. Housekeeping these documents remains a challenge. Different versions of the same documents are available on different LAN share. Sometimes, documents get deleted unintentionally or get overwritten by different versions.

Face-to-face communication is the best. Getting all the team members in one room using the excuse of teambuilding is not a bad idea. But teams with more than 50 persons spanning across the network is a problem.

NA/SA

Face-to-face interaction is still listed as number one in America. Different working hours are the major concern. In America, a typical work day is not the same as other regions. Some employees start at 9am, some at 8am and there are those that start as early as 6am.

Conference calls have become the norm. Employees have to clock many late nights. It is must easier to work with US counterparts. For some employees in South America, communication is a problem. Many can write good English but conversing in English pose a greater challenge. Another challenge for South American is the communication infrastructure. Quality and consistent service of telephone lines, mobile phone providers and cables is a challenge.

These are the results:

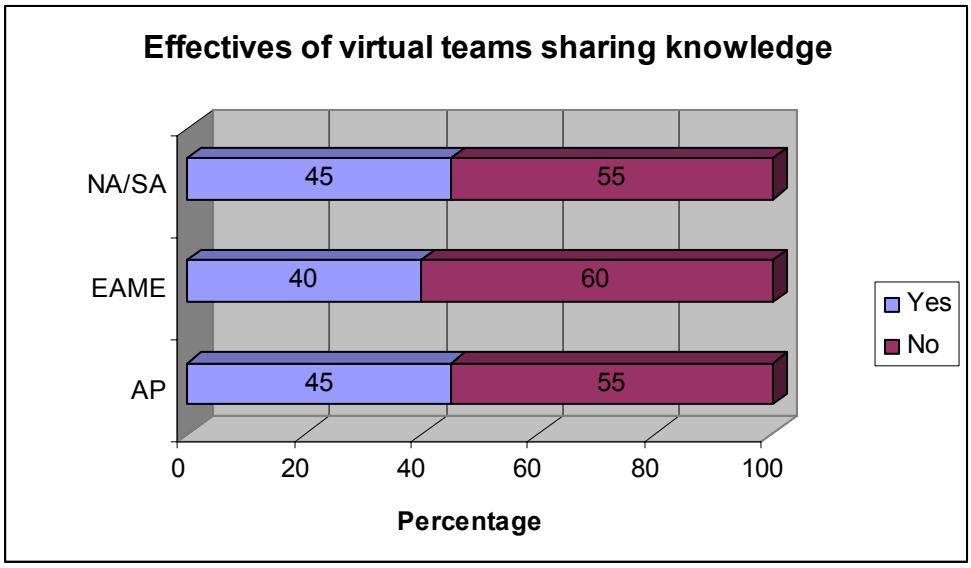


Figure 26: Individual zone results of effectiveness of global virtual teams on sharing knowledge.

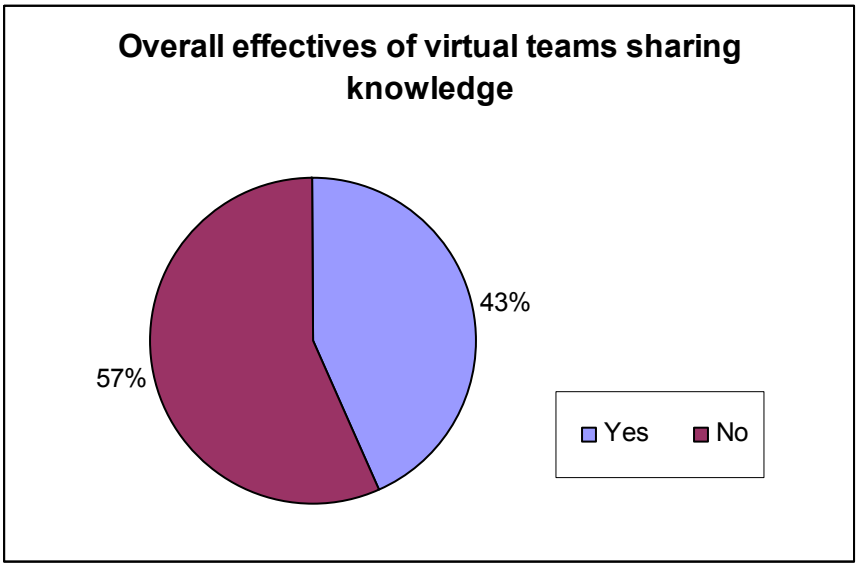


Figure 27: Total results of effectiveness of global virtual teams on sharing knowledge.

Figure 26 and 27 above reveals the results of the effectiveness of sharing knowledge within a global team. A global group consists of more than 5 persons with a minimum of two regions. If for example the work is within Thailand, Malaysia and Singapore, it is considered as a regional group. The results are about 50-50 with respondents leaning towards the negativity of information sharing in a global team. Challenges such as timing (time zones), language and culture were revealed.

(4) What are the challenges of working in a virtual team/environment?

For this question, I have the candidates mention some of the key challenges on top of their head. It is treated somewhat like a brainstorming session. I used this method because I believe that participants provide the best answers when they do not have to ponder too much on the questions. Therefore, I am trying to seek the best, natural and un-weighted answer that is high on the candidates' list.

The results are pretty interesting. In the table below, I have listed the most mentioned challenges faced by these EMIT employees:

Challenges/Barriers	Number of times mentioned
Working together in the same location	12
Face-to-face interaction/Body language	10
Time difference	9
Information Technology	6
Language	6
Company procedures	4
Co-location with supervisor/team leads	3
Quality telephone/cable service provides	2

Figure 28: Results of challenges faced by global virtual teams

Most of the candidates feel that it is important to work together in the same location. That way, working-bond can be established and it is easier to share information. The same issue is actually happening in Singapore. There are a few work locations in Singapore and the team were split into two locations with the main team sitting in the headquarters while the rest of the team are located in the refinery. This issue was brought up several times in management meeting but nothing was done about it. Employees that were separated from the main group feel that management did not take them seriously as no substantial reason was provided for the seating arrangement.

Face-to-face interaction was also high on the list. With the "faceless" way of working, candidates do not know how to react to a person on the phone or email without seeing the reaction of the person. Somehow, information can be put across differently by reading the other person's body language. With face-to-face, ambiguity can be immediately corrected.

Perhaps the most intriguing one is on Information Technology. A couple of candidates lamented that although IT increases productivity but sometimes it also impedes a

person's work. For example, EM uses a tool called Instant Messaging (IM) which is a text message service on the network. IM connects all the employees on the network and enables each and everyone to communicate on that channel. According to the candidates, many a times, they have to stop what they are working on in order to conduct an "online chat" with users or other colleagues. Ideas were put across but sometimes with the wrong interpretation. Many felt that using the phone would be a better option.

Co-location was mentioned several times too. What this term meant is that in this globalisation world, subordinates are not located in the same country as their managers, supervisor or team leaders. Therefore, the subordinates feel at a disadvantage as their work was not visible to their immediate supervisor – which may be the main cause of a drop in morale. This has an underlying issue, which relates to their salary increment and promotion. Therefore, some employees take things in their own stride and try to work doubly hard than the rest of the co-workers.

The answers I have discovered from these interview sessions are an eye-opener. More than fifty percent of the answers revealed that KM did not deliver what was promised. There was not much variation in the results across time zones. Perhaps it is the strong EM culture that most of the employees have similar traits or behaviours. Why the negativity against KM? On more than one occasion, culture was mentioned (see Appendix D). Perhaps, by understanding the difference in work culture, virtual teamwork could fare better.

8 Recommendation for future development

Coping with the uncertainty of a dynamically changing environment requires the capabilities "to create new knowledge, disseminate it through the organisation and embody it in products, services and systems" (Nonaka and Tekeuchi, 1995). While the theory of knowledge creation and dissemination appeal in terms of organisational learning for EM, this research reveals that it is still in its infancy stage.

Based on the combined framework KM framework found in Section 7 (see Figure 20 above), EMIT falls short in the team work area. EMIT especially in the SAS (SAP) division has no shortages of talents, which contributes to the pool of knowledge workers. As for the five pillars, it has the following resources:

Acquisition – Engaged consultants from reputable companies (in EMIT's case, most of the brains are from Accenture)
Dedicated resources – has different groups of experts to take care of KM issues, especially this subject is driven by top management
Fusion – the SAS global team, especially the group researched (Basis team) is made up of a concoction of employees with a diversity of background. With a team spanning across different regions, there are bound to be abundant of ideas surfaced in every meetings.
Adaptation – EMIT as an organisation is ever-changing. It has but a few months ago, integrated the three different IT under one roof and called it ExxonMobil Information Technology, as opposed to Global Information Services (GIS). This topic is touched on in Section 7 above.
Networks -- Emails group distribution list as well as Lotus Notes database share are heavily utilised for the purpose of information sharing. This topic is also covered in Section 7.4.1 above.

As for Information Technology, there are enough resources to aid knowledge creation, dissemination and utilisation. Global share folders on dedicated servers for documents placement and sharing, NetMeeting to aid those long telephone conferences, Instant Messaging to obtain quick information for your colleague sitting 1,000 kilometres away as well as the use of notebooks and blackberries for instant information.

Despite these resources, there are some underlying nervousness, particularly on globalisation work, off-shore talents and cultural issues. There is no magic wand to make such issues disappear, but there are a couple of key points for EMIT to adopt the KM enablement in a global team environment.

Based on the interview questions above, these are some of the recommendations that EMIT could consider:

(1) To increase the effectiveness of sharing and transfer of knowledge in a global team, do:

- Continue utilising the good change management and handover process. Even though the process is good, it would not hurt if the process is evaluated and updated periodically.
- Retain knowledgeable technical person. It is imperative for EMIT to do so as the organisation invests at least 10 years for an employee to achieve the desired technical level. To do so, perhaps EMIT could consider creating a technical career ladder similar to the management ladder. This would motivate and reward technical employees with due promotions.

(2) To minimise the effects of in-sourcing on knowledge transfer, do:

- Emphasise that in-sourcing is not a management tool to retrench workers rather it is used to streamline process. Senior management should "walk the talk" and reiterate this as often as possible.

- Stop brain drain by identifying the reasons for high-turnover in BSCs. Conduct a work study to evaluate the success factors of certain BSC and try to emulate across other BSCs.
- Do away with regimented working hours. Create a more flexible work environment for employees (with virtual teams) by giving them the opting to either start work later in the day or work from home.

(3) To increase the efficiency of knowledge sharing amongst virtual teams, do:

- Conduct annual team building to bond the entire team.
- Achieve greater cultural understanding by utilizing Globesmart (see Appendix D)
- EMIT can consider investing in a good document management system, to do away with the anxiety of multiple versions or overwriting of documents.

(4) To reduce the challenges of working in a virtual environment, do:

- Create a "yellow pages" containing employees' bio data. This makes the "faceless" work culture less painful.
- Conduct periodic IT training or communication of "best practices" on using common IT tools, ie, emails, netmeeting, instant messaging, etc. Try to increase the awareness of good working ethics. Such sharing can be conducted during lunch time – we can call it "Lunch and Learn".

8.1 Creating awareness, commitment across the EMIT organisation

In order to create awareness and commitment across the EMIT organisation, the company can include diversity training as part of EM's training roadmap. We can take a page out of Microsoft's KM training program (see Figure 29).

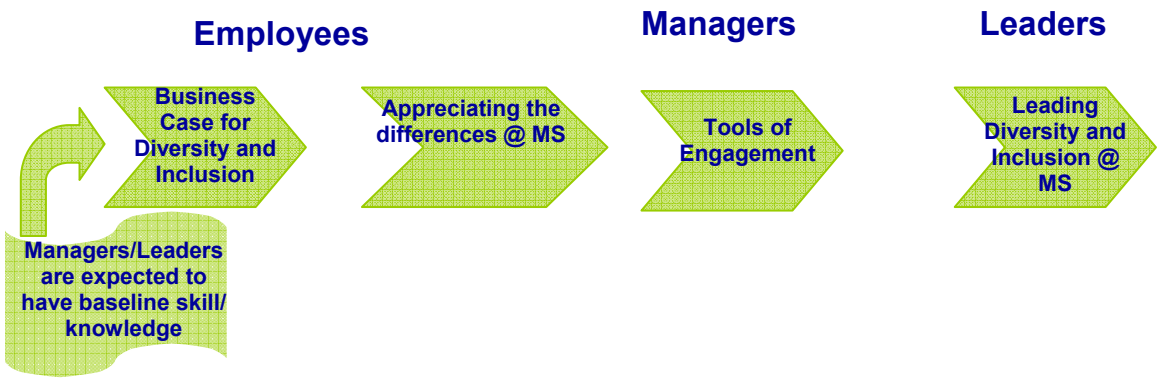


Figure 29: Microsoft's Diversity and Inclusion Training Program, February 2005. Source: Globesmart Training, Aug 2005.

According to Kelly (1995), two heads are better than one but more then two is even better. If the decision-making process is effective, it pulls together the skills, knowledge, experience and opinions of the group and produces a solution that is far greater than the sum of its parts.

Team Effectiveness is also an important focal point of KM. Always start with the foundation – relationship. Without mutual trust, there would be suspicion in the team. Without mutual understanding and support the team will go downhill. Only with a strong team, managers can look at processes and how to teak them to become more efficient. Identify the person (in this case the business owner) to take ownership of the process and be accountable for it. With the business and IT working hand-in-hand, goals can be mapped, agreed upon and faster realisation. Figure 30 below shows a diagram of a team effectiveness model. The foundation of the model is built on mutual support in the form of trust and team work for every relationship. Only then can the organisation obtain efficiencies through collaboration which finally leads to one common goal.

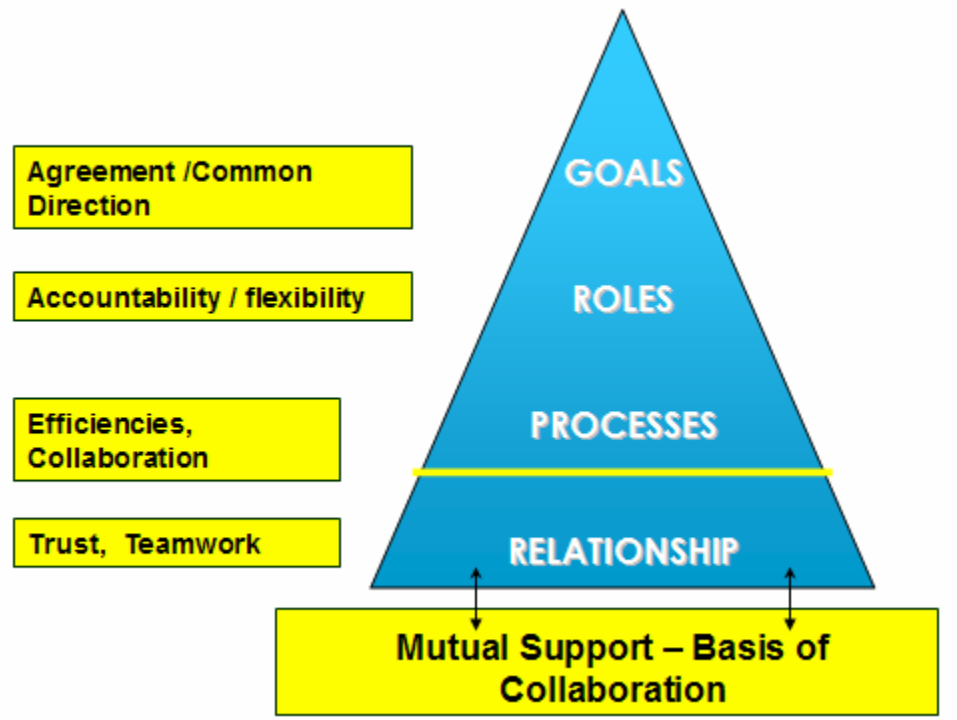


Figure 30: Team Effectiveness Model

Source: Globesmart Training, August 2005.

Figure 31 below is a chart taken from a EMIT Knowledge Management presentation in April 2006. It shows the importance of KM and how it fits into the IT maturity model. It has three stages, (i) Beginning (ii) Advancing and (iii) Expanding Influence Stage. Each stages or hierarchy must be fulfilled before it can be advanced to the next stage. The foundations are the people – the organisation's employees. With enough trust and sharing, it will influence knowledge exchange. The peak of this model is to reach the ultimatum, innovation.

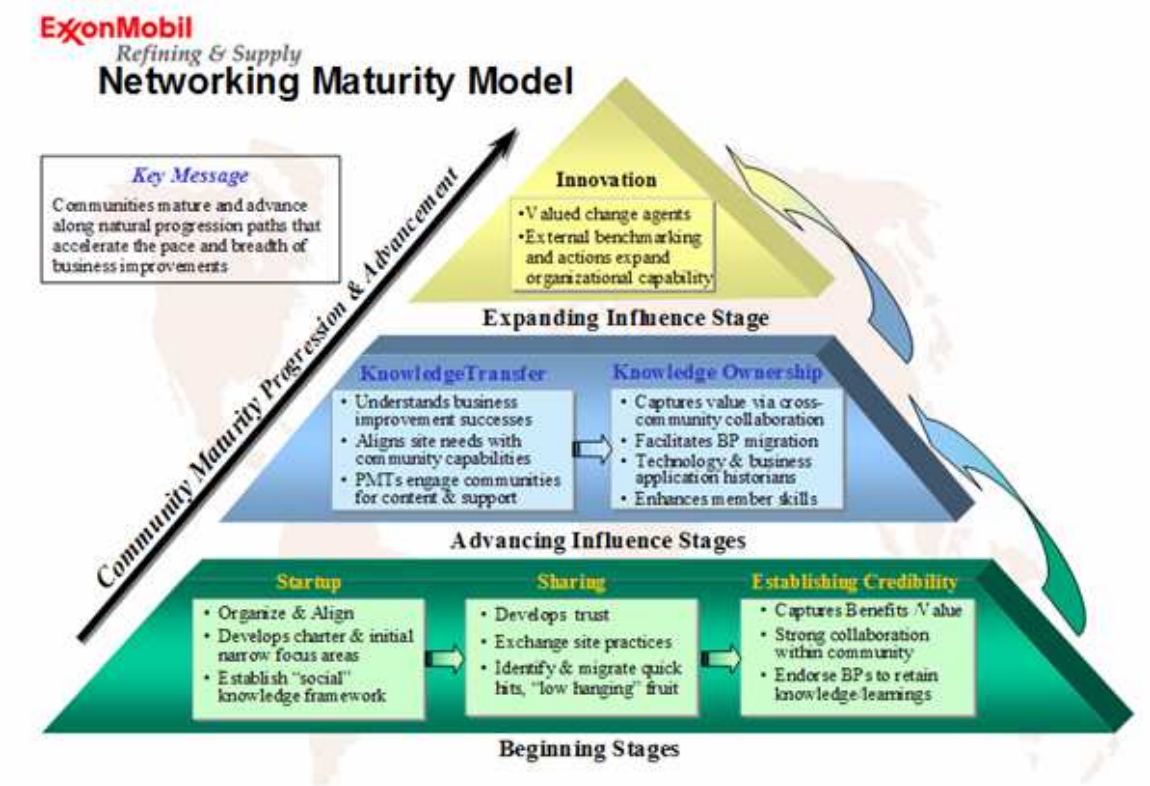


Figure 31: Networking Maturity Model
Source: EMIT, SAS KM Ideas, 1 April, 2006

Therefore, what EMIT is trying to do is to provide a suitable environment that encourages growth through sharing. As per the words of Allen F. Jacobson, CEO of 3M Corporation, "You can provide an environment in which creativity will flourish" (Lumsdaine and Binks, 2005).

Peters (2000) wrote that intangible asset such as knowledge account for more value in the economy than the intangibles but companies rarely protect them as carefully as they do on the tangible brick and mortal assets. She asked, "What would you do if your smartest people suddenly left? How can you ensure that what one department or division learns is widely shared thought the company?" She summarised KM in four practical steps:

1. **Create a setting for sharing knowledge** by ensuring everyone's involved which can be achieved by open meeting policy.

2. **Eliminate communication "filters"**. Allow employees to skip hierarchical level via outside channels to lead to more ideas and how to do things better.

3. **Prioritize the tasks**. Prioritising process aligns brainpower and effort to accomplish tasks at hand. Such process lets people challenge assumptions on the value of long-running projects, share knowledge about what is being accomplished and breakdown department barriers that bottle-up ideas and creativity.

4. **Keep time budgets**. Know where time and effort really matters.

The paper ended with the following illustration, "Picasso had a collection of masterpieces in his home. They were hung slightly crooked, and visitors couldn't resist the temptation to straighten them. But Picasso felt that when a painting was straight, the observer focused on the frame around it. When the frame was crooked, the beauty of the image jumped out." She also mentioned that, KM is synonymous with knowledge. Instead of trying to put boundaries around it, we should be letting it jump out of its frame.

8.2 Recommendation

There are several critical success factors in building KM in EM especially within the EMIT function. Listed here are four types of challenges that EMIT could face including some recommendations to overcome the challenges:

1. **Management Challenge**

   The most important aspect in any type of deliverance is getting management's buy-in to the idea. Ideas are easily achievable if the directive is top-down. Therefore, as managers, it is vital for them to:

   - **Focus on the topic** that is important to business and IT employees. In this case, focus on KM in the context of knowledge creation, sharing and utilisation. The focus is important for concentration as too many initiatives will cause wavering support.
   - Select a well-respected facilitator to bridge the gap between IT and business. This is to **reduce any disconnection** felt between business users with EMIT especially during the vulnerable time when there is a change (attrition, out-placement or retrenchment) in the IT area.
   - Create the **right environment** to make sure that employees have the time and encouragement to embrace KM.
   - Build on the strength of the organisation's **core values or culture**.

   According to Hansen, Nohria and Tierney (1999), a company's strategy for KM should reflect its competitive strategy. Competitive strategy must drive KM strategy.

2. **Knowledge/Network challenge**

   Knowledge network is the knowledge is generated through informal, self-organising networks within organisation which over time may become more formalised. In order to do so, EMIT could:

   - Get **key persons/leaders involved** as early as possible. This is to ensure buy-in from all levels of management.
   - **Build personal relationship** among members. It can be a formal group (project group or a division as identified by management) or an more informal group (a lunch group or the company's recreation club).
   - Develop an active and passionate **core group**.
   - Create **forums** to brainstorm ideas as well as sharing information.
   - Employees are the best at creating intellectual capital. They act as a **"free-agent"** volunteering their services not because it is mandatory for them to keep their job, but because they like it. This may be because they feel emotionally connected to the team members and/or they feel committed to the organisation (English and Baker, 2006).

3. **Technical Challenge**

   Technical challenge lean more towards the IT infrastructure. The infrastructure must be able to support the KM initiatives (such as document management systems and common work spaces) directed by management. Therefore:

   - Make it **easy to contribute and access** to knowledge systems and to share information. So called "power-users" who are trained in the systems can create short frequently-asked-questions write-ups or conduct forums to trained more users to get on board the KM fever.

4. Personal Challenge

One problem with new initiatives is management does not get proper feedback. It actually work both ways, either the management does not want to listen to its subordinates or the subordinates do not take the initiative to provide constructive feedback. One way to counter that is to:

- Create **real dialogue** about cutting edge issues. Make it easy for employees to contribute ideas or feedback. Perhaps, the contribution can be obtained anonymously.
- Identify a **mentor/coach** within the company. This confidante should be a person that is comfortable to talk to and can identify the person's strengths and weaknesses and provide the right amount of push.

9 Limitations and Future research

9.1 Limitations

As with any research, there are bound to be limitations. Therefore, caution is advised in interpreting the results. In this case the research is somewhat biased. As stated earlier, the focus is on a SAP sub-group, the Basis process team. The views expressed by the members may be narrowed as it is seen from one angle, which may fall victim to the *comfortable clone syndrome*. According to Leonard and Straus (1997) comfortable clone syndrome means that coworkers share similar interests and training: everyone thinks alike. Therefore, candidates from different countries were randomly selected so as to make the results more varied so as to provide more meaningful insights into the research question. In addition, the relatively small sample used for the predictor of data may potentially raise concern. However, generalisation beyond the group may not be possible for this research as the technology used (application and software-wise) by different groups are vastly different.

The study is done primarily on the IT employees. Therefore, there may be some disconnection between IT users and IT workers.

The results interpreted in this research are of a general view. With time permitting, the pool can be widen and divided into three levels, (i) programmer/analyst, (ii) team lead/supervisor and (iii) manager/senior management. The research result can portray the use of KM in different levels of responsibilities.

Perhaps a more appropriate measure of the theoretical concepts could focus on knowledge creation, dissemination and utilisation in general, rather then a few specific applications.

9.2 Future research

Although further scale of research is necessary, but I hope that this research has established some foundation for empirical study of the theory of KM in EM. For future research, firstly, widen the selection pool to include different IT divisions. These can be from the Business Line Applications (non-SAP applications), infrastructure and applications (dealing with hardware issues), voice and network (LAN, WAN and wireless connectivity), DIAL and planning and support. The research can choose to either focus on the local or global IT KM exchange.

EM has a strong company culture. The paper can conduct a more in-depth research on the influence of culture in EM's KM process.

This paper is just a first step. As a traditional Chinese saying goes, "a journey of a thousand *li*[20] begins with a single step". Much research is required in this area. The good news is, the upper IT management are no longer taking a backseat on KM. Small morsels of KM initiatives are being dished out as this paper is being sent to production. Hopefully in time, acquiring, maintaining and deploying KM will be part of EM's company work culture.

[20] Li is a Chinese measurement of distance which is equivalent to 1/3 of a mile.

10 Conclusion

The KM that was presented in this paper shows very clearly why so many books and articles are dedicated to this subject. Without a KM system, when employees and managers leave the organisation, they take their experience, know-how, skills and creativity with them. Organisations do not own human capital; employees and managers do. To protect against excessive loss and make best practices knowledge a competitive advantage, organisations have made concerted efforts to convert tacit knowledge to codified or explicit forms by striving to acquire, create, use, transfer and reuse that knowledge (English and Baker, 2006).

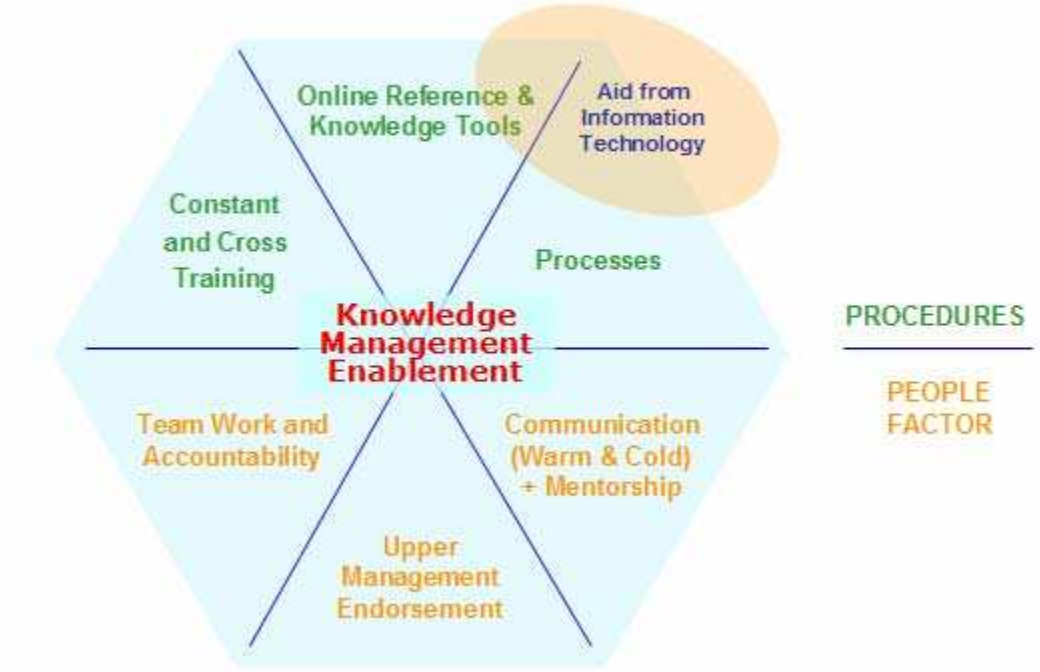


Figure 32: KM as an enablement for ExxonMobil

KM is neither an IT nor a process invention. It is a combination of both. It is a model that is not easy to achieve and constantly have to face an uphill battle. Nevertheless, this subject has been evolving for the past decade and is still being spoken about. A key element of a KM concept is a requirement to address People, Process and

Technology issues in tandem and not focus on any element (Bhatt, 2000). To make KM useful, EM could follow the recommendations proposed in Section 8 and adopt the hexagon chart above (see Figure 32). The orange font denotes action by people. The green font denotes the procedures that have to be put in placed to enable exchange of KM. All of the above are inter-related. In breakdown in one area will cause the other areas to suffer. It is important for EM to find the equilibrium. Trials and turbulences will be there to help the company grow stronger. Garvin (1993) wrote that no learning organisation is built overnight. Success comes from carefully cultivated attitudes, commitments, and management processes that accrue slowly and steadily.

Some key lessons that other organisations could learn from this study are:
Lesson #1: Grow intellectual capital and this is the only asset that appreciates.
Lesson #2: Tell as much stories as possible.
Lesson #3: Never underestimate or ridicule other's mistakes. Always learn from others.
Lesson #4: Adopt the "Keep Learning" attitude.

To sum it all up, leaders play a huge role in Knowledge Management. The focus for managers is to manage their own and others' knowledge acquisition processes. Focus on common vision and strategy that all employees can support. They help people to learn, via mentoring, providing new experiences, and/or providing resources for education and training. Apart from that, forums play a key role too. In such environment, people can share their knowledge and experiences and help others to build on existing knowledge and experience. Not only that, managers can give people the opportunity to put their knowledge and skills to use by ensuring that people are given the vision, the skills, the time, the resources and the rewards necessary to gain knowledge, build on it, share it and then use it to add value for others.

(Word count: 21, 223)

Appendix A: Biography: Ikujiro Nonaka

Ikujiro Nonaka is Xerox Professor of Knowledge at the Haas School of Business, UC Berkeley, and a professor at the Graduate School of International Corporate Strategy at Hitotsubashi University in Tokyo. He also is the Visiting Dean of the Center for Knowledge and Innovation Research (CKIR) at the Helsinki School of Economics and Business Administration and the founding dean of the Graduate School of Knowledge Science at Japan Advanced Institute of Science and Technology. Nonaka received both his MBA and Ph.D. in business from the University of California at Berkeley and has long been one of Japan's foremost authorities on developing and using the intellectual capital of workers to create and expand business knowledge.

In his interview with Claus Otto Scharmer (1996), Nonaka became interested in organisation theory after taking a sociology course as a minor for his doctorate study in University of California Berkeley under the tutelage of professors Neil J. Smelser and Arthur L. Stinchcombe. In 1960s, he focused on the environment influencing organisational structure. He tried to explain the relationship between an organisation and its environment from the perspective of information processing.

The turning point from information to knowledge came in March 1984 when he participated with his colleagues Hirotaka Takeuchi and Ken-ichi Imai in the Harvard Business School 75th Anniversary Colloquium on productivity and technology. Through his research, he found that existing theory of information processing was not enough and innovation process was more than simply information processing. It includes a process of capturing, creating, leveraging and retaining knowledge. That was how he discovered the concept of knowledge creation. Nonaka simplified the difference between information creation and knowledge creation by stating that information is the flow and knowledge is the stock. He and Takeuchi proposed a model of knowledge creation process to understand the dynamic nature of knowledge creation and to manage the process effectively. It consists of three elements:

1) Spiral knowledge creation process or the SECI model
2) Ba
3) Knowledge assets

Appendix B: Interview: ExxonMobil V. P. Patricia C. Hewlett

By Pam Baker
January 17, 2006 7:00AM

At ExxonMobil, I.T. plays a huge role in monitoring and assessing the changing demands on the company's work force, said Patricia C. Hewlett. "Our size has enabled us to take a fundamentally different approach than other companies," she said. "Instead of outsourcing, we have developed our own centers of expertise around the world."

Sitting at the I.T. helm of the world's largest publicly traded energy company is Patricia C. Hewlett, vice president of ExxonMobil's Global Information Services organization. ExxonMobil operates in about 200 countries and territories. The company counted $25.3 billion in net income for 2004; it hasn't finished counting the billions for 2005.

A native of Hammond, Louisiana, Hewlett is a 1972 graduate of Louisiana State University. In her 32-year career, she has held numerous leadership and management positions in ExxonMobil's Controllers and Information Systems organizations. She now is responsible for information-systems activities for the corporation worldwide.

Hewlett also has served in many capacities for industry and professional organizations, including the Research Board, the Conference Board's Council of Information Management Executives, the Working Council of CIOs, the Director and Information Systems Committee Chair for the Houston Chapter of the Financial Executives Institute, and the College Relations Committee of the Dallas Chapter of the Financial Executives Institute. In 1997, she was inducted into the YWCA's Academy of Women Achievers, one of the most prestigious honors for professional women in the United States.

Hewlett exudes confidence and warmth, and laughs easily during an interview with CIO Today. She wears authority as though she were born with it. Here she tells the inside story of one of the most powerful energy companies on Earth.

CIO Today: What are your top I.T. concerns?

Hewlett: The constant focus for me is maximizing I.T.'s contribution to ExxonMobil's bottom line. That's always a core objective. We constantly push to stay ahead of the competition, both in effectively leveraging information technology, and in efficient delivery of our core I.T. services. We want to bring the right technology to bear, at the right time, on the right business opportunities, to create the maximum competitive advantage for ExxonMobil and its affiliates.

The second major focus I would identify is people. We work continuously to attract, develop, and retain a high-quality, globally diverse work force that can respond successfully to the ever-changing demands of our global energy business. In the high-tech arena, you simply cannot rest on your laurels. We constantly monitor and assess the changing demands on our work force, and the ways in which we can better prepare them for the next big challenge.

One example is that we have increased our focus on areas like knowledge management and organizational learning. Our size has enabled us to take a fundamentally different approach than other companies. Instead of outsourcing, we have developed our own centers of expertise around the world.

CIO Today: Has the I.T. environment changed from five years ago?

Hewlett: Compared to five years ago [roughly the time of the Exxon and Mobil merger in 1999], our I.T. environment is substantially more global across our affiliates worldwide. Prior to the merger, most of the systems in the two companies were country-specific and/or business-unit-specific. Now our standardized desktop, server, and network infrastructure and shared applications enable the business units to reap many competitive advantages.

ExxonMobil has always placed an extremely high priority on security, and that emphasis has become even more important to our business in the last five years. During this period we've seen many areas where our standards become the industry norm; however, we have not stood still waiting for others to catch up. For example, we have increased our use of penetration tests to identify security issues before production deployment of new I.T. solutions. Data privacy is also a much bigger issue now than even five years ago. In some situations,

data privacy compliance issues spill over to affect other areas, like security procedures and software-license compliance.

Every year, computer systems become more integrated into every aspect of our business; everything stops when the systems go down. ExxonMobil companies are making real-time decisions around the world based on the latest available data, so we continuously strive for 24/7 availability. Increased network speeds coupled with greater access to mobile devices and wireless connectivity have made both end users and support staff more mobile. Besides increasing end user productivity, these connectivity improvements enable us to implement "follow the sun" support models, providing real-time help 24 hours a day.

CIO Today: How have new legislative demands affected I.T.?

Hewlett: ExxonMobil's long-standing focus on security and controls in all aspects of I.T. helped position us well for a smooth Sarbanes-Oxley implementation. Other new legislative demands, particularly in the data-privacy and export-control arenas, have also demanded more work and complicated the task of implementing global processes.

Given the evolving legislative environment, we'll continue to devote significant resources to data-privacy compliance, especially with respect to transnational data flows. Finally, regulatory standards, such as those recently implemented for the payment-card industry, have and will continue to have a sizeable impact on our business.

CIO Today: Which enterprise component or technology will be growing most in terms of its slice of your company's budget pie in the next 12 months?

Hewlett: We pride ourselves on our approach to I.T. governance, with active business and corporate management engagement in I.T. strategies, priorities, and funding levels. We accomplish a competitive cost structure through disciplined introduction of new technologies and rigorous management of core services. That being said, I would identify three growth areas in the next year: wireless communications, e-business, and service-oriented architecture.

Wireless technology is our biggest percentage growth slice. Due primarily to security concerns and the immaturity of the industry, we have invested in wireless technologies at a measured pace.

Another growth area is e-business. For us, this encompasses both internally facing intranet applications -- essentially knowledge-management software that benefits our people -- and externally facing Internet applications aimed at improving our interactions with our vendors, partners, and customers.

The final growth area I would cite is service-oriented architecture. We are still in the early stages of evaluation, but we believe there is real business improvement opportunity through better integration of applications and processes that can improve our speed and agility in responding to rapidly changing business environments.

CIO Today: Can you walk us through the decision-making process of implementing a large-scale business-process management initiative?

Hewlett: All business-process change initiatives are based on business needs, usually identified during the annual review of a five-year I.T. strategy. The key elements of our approach are strong business sponsorship, profitable returns, and rigorous execution methodology.

We have a business I.T. manager aligned with each of our major business segments [Upstream, Downstream, and Chemicals], who works closely with the business to identify and prioritize the I.T. work necessary to achieving their respective business objectives. Major new initiatives receive executive business sponsorship. Large initiatives generated from our I.T. service lines, such as the recent global upgrade of our desktop infrastructure, are reviewed and endorsed by a global I.T. council composed of senior business executives.

Both business-generated and I.T. service-generated projects are analyzed to ensure they will generate acceptable economic returns, and then are subjected to a gating methodology that includes reviews and sign-offs by business and I.T. gatekeepers at critical intervals. When projects involving significant business processes change, we add business experts to the project teams to work change-management issues.

These people also develop the expertise to function as power users and change advocates after the project is completed. All major business-process change initiatives and I.T. projects are subject to a post-implementation reappraisal process to ensure we capture lessons learned for the future.

CIO Today: What are one or two software or hardware products your company uses that you would describe as outstanding?

Hewlett: I wouldn't label any particular hardware or software product "outstanding" in and of itself. What gets us to "outstanding" is the way we engineer and deploy combinations of hardware and software tools and processes to provide standard I.T. services that are secure, cost-effective, and reliable for ExxonMobil companies worldwide. For example, in 2001 we implemented a single desktop, featuring standard software components and standard desktop and notebook hardware. Therefore, we were able to more easily manage the next upgrade this past year.

In our data centers, we deploy high-reliability hardware and software solutions to support some of the world's largest ERP systems. We provide secure and reliable I.T. communications support for ExxonMobil companies worldwide by engineering and deploying fault-tolerant data networks. So for us the focus isn't so much on any particular piece of hardware or software; instead, we believe the way we deploy those hardware and software tools and the related standard processes with "flawless execution" has been what takes us from "good" to "outstanding."

CIO Today: Which emerging technology do you see as the most important to the enterprise?

Hewlett: I can point to a few emerging technologies we view as particularly high-value investments. To support our globally dispersed and increasingly mobile workforce, knowledge management, collaboration, and wireless communication technologies are more important to our success than ever. This far-flung network of people and machines makes identity-management and threat-management technologies incredibly important.

As I mentioned earlier, service-oriented architecture and its associated technologies are going to be critical to our ability to respond to business change and lower costs. Finally, new "smart sensor" technology is going to be a key enabler for improving areas like asset visibility in the supply chain, environmental monitoring, and maintenance management.

CIO Today: Where do you go to do your research on new technologies?

Hewlett: ExxonMobil has an annual and ongoing technology surveillance program with a scope of three to five years. Our intent is not to implement every new technology we find, but rather to identify and prioritize key technologies that we believe could have strong business value, and then "incubate" them in a controlled environment. This way we can position I.T. solutions ahead of the relevant business opportunities, rather than reacting after an opportunity is identified.

A short list of technology research sources would include advisory services, vendors and suppliers, consulting partners, academia, and venture-capital firms. Nondisclosure meetings with key vendors remain the best method for researching core strategic solutions. Conferences and consulting firms are useful for broader general-direction research.

In the end, though, it all comes back to our people. By providing an inclusive, creative, stimulating work environment, we encourage and empower our people to find and develop cutting-edge technologies that will help us outperform the competition. Success in our business requires performance over long time frames, and it's our people who will drive successful innovation over the long term.

Appendix C: EM SAP Knowledge Management – Early Wins

Suggestion	Benefit (H, M, L)	Ease of Impl'n (H, M, L)	Culture	COP	Contacts	Guidelines	Resources	ToolS	Evaluate	Notes:
Management to encourage people to ask questions and share information and elevate the priority of quality documentation	H	H	X							Documentation needs to be a full member of the priority mix.
To start encouraging the culture - provide a few KM overview slides to share with SAS teams - basic principles of why KM "general interest" is important	H	H	X							
Encourage and recognize mentoring of new staff in each team	H	M	X		X					
Hold periodic "know-how" / learning sessions in each team (actively expected and supported by management)	M	M	X	X						Staff need to be an equal source to determine of what's needed.

Invite Power Users to give "Lunch-n-Learn" sessions about educating the CoE on real-world system use, issues, changes desired, support needs, etc.	M	M	X							
Develop and publish a contact list across SAS for the best suggested people for select areas of more specialized knowledge	H	M			X					Including expertise from prior roles
Ensure ALL job transitions have a detailed transition plan and completion review	H	M				X			X	
Ensure documentation upkeep responsibilities are clear on each team. Generally if you are the author of documentation then you are responsible for keeping it evergreen.	M	L				X				
Encourage "Learners" create or enhance useful "How-to" documents for themselves and others to use later (properly filed)	M	M				X				
Rotate primary and backup roles for support to build more capability	H	L				X				
Encourage teams to record **why** key decisions were taken - e.g. use a "Decision Record" OR document it in the specs / config summary / program documentation, etc	H	L				X				

For Projects: 1 month after startup have the project team conduct a knowledge transfer session(s) with the support team	M	M				X				As part of overall tranition to support
Managers to request that travel plans always include time for Knowledge Transfer sessions with other team members	M	H				X				
Define owners of the most useful reference documents - in the document.	M	L				X				
Spread expertise by assigning similar PMTS tickets to different people	M	M				X				
Promote use of LAN Shortcuts to better cross-reference files (properly defined to work for all)	M	L				X				
Each SAS team appoints a documentation champion to work within existing content tools	H	M					X			Next to management support - Key to shifting team culture and imprpving KM discipline
Rationalise, clean up and make better use of existing LAN structures in all teams	H	L					X			
Ensure critical CoE reference information for each team is stored in some form of commonly accessible library (preferably read-only)	H	L					X			

Develop ideas on what other activities can be reduced to allow more attention to KM within each team	M	L					X			
Develop candidate list of benefitial topic areas for an SAS Community of Practice (including ones already functioning)	H	M		X						
SAS documentation champions form a community of practice	H	H		X						
Begin investigation into the value and options for a SAS repository of problem solutions	H	L						X		Similar concept to SAP-OSS Message (PMTS) vs OSS Note (Solution DB). Needs keyword coding and good search capability.
Consider volunteering SAS GCSS to participate in a SHAREPOINT Pilot for GIS and assist in defining it's value and use in GIS	M	M						X		
Team leads should monitor that adequate detail about problem resolution is recorded in PMTS, MIRS.	M	L	x					X		
Create representative case studies from actual PMTS and CMTS tickets to train new team members	M	M						X		

Keep all Training materials for CoE staff in one place (repository) for each major SAS system	M	L						X		eg Expand the BSC training Global Share
Develop a library of REMEDY Macros to extract various useful PMTS ticket views and and promote their use	M	M						X		
Regularly review the job / knowledge transfer plans in detail to keep on track	H	M							X	

Appendix D: Cultural Issues based on Professor Geert Hofstede's 5 Models[21]

> *"Culture is more often a source of conflict than of synergy. Cultural differences are a nuisance at best and often a disaster."*
>
> *~ Prof. Geert Hofstede, Emeritus Professor, Maastricht University*[22].

Culture played an important role in KM. Let us have a look at what Professor Geert Hofstede have to say about culture. Hofstede's research provides insights into other cultures so that people are more well informed and can be more effective when interaction with people in other countries. The information obtained should reduce a person's level of frustration, anxiety and concerns.

Figure 33 below shows Professor Hofstede's five models. The five models are:

- PDI – Power Distance Index
- IDV – Individualism
- MAS – Masculinity
- UAI – Uncertainty Avoidance Index
- LTO – Long-Term Orientation

Power Distance Index (PDI) focuses on the degree of equality, or inequality, between people in the country's society. A High Power Distance ranking indicates that inequalities of power and wealth have been allowed to grow within the society. These societies are more likely to follow a caste system that does not allow significant upward mobility of its citizens. A Low Power

[21] Extracted from http://www.geert-hofstede.com/ on 30 July, 2006

[22] Quoted from http://www.geert-hofstede.com/

Distance ranking indicates the society de-emphasizes the differences between citizen's power and wealth. In these societies equality and opportunity for everyone is stressed.

Individualism (IDV) focuses on the degree the society reinforces individual or collective achievement and interpersonal relationships. A High Individualism ranking indicates that individuality and individual rights are paramount within the society. Individuals in these societies may tend to form a larger number of looser relationships. A Low Individualism ranking typifies societies of a more collectivist nature with close ties between individuals. These cultures reinforce extended families and collectives where everyone takes responsibility for fellow members of their group.

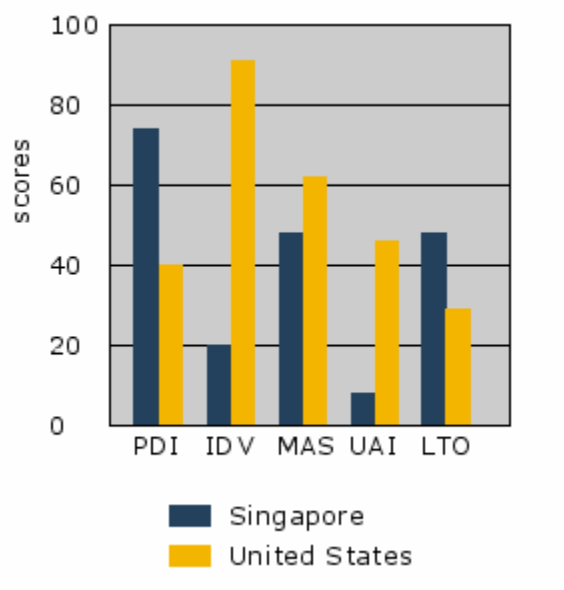
Masculinity (MAS) focuses on the degree the society reinforces, or does not reinforce, the traditional masculine work role model of male achievement, control, and power. A High Masculinity ranking indicates the country experiences a high degree of gender differentiation. In these cultures, males dominate a significant portion of the society and power structure, with females being controlled by male domination. A Low Masculinity ranking indicates the country has a low level of differentiation and discrimination between genders. In these cultures, females are treated equally to males in all aspects of the society.

Uncertainty Avoidance Index (UAI) focuses on the level of tolerance for uncertainty and ambiguity within the society - i.e. unstructured situations. A High Uncertainty Avoidance ranking indicates the country has a low tolerance for uncertainty and ambiguity. This creates a rule-oriented society that institutes laws, rules, regulations, and controls in order to reduce the amount of uncertainty. A Low Uncertainty Avoidance ranking indicates the country has less concern about ambiguity and uncertainty and has more tolerance for a variety of opinions. This is reflected in a society that is less rule-oriented, more readily accepts change, and takes more and greater risks.

Long-Term Orientation (LTO) focuses on the degree the society embraces, or does not embrace, long-term devotion to traditional, forward thinking values. High Long-Term Orientation ranking indicates the country prescribes to the values of long-term commitments and respect for tradition. This is thought to support a strong work ethic where long-term rewards are expected as a result of today's hard work. However, business may take longer to develop in

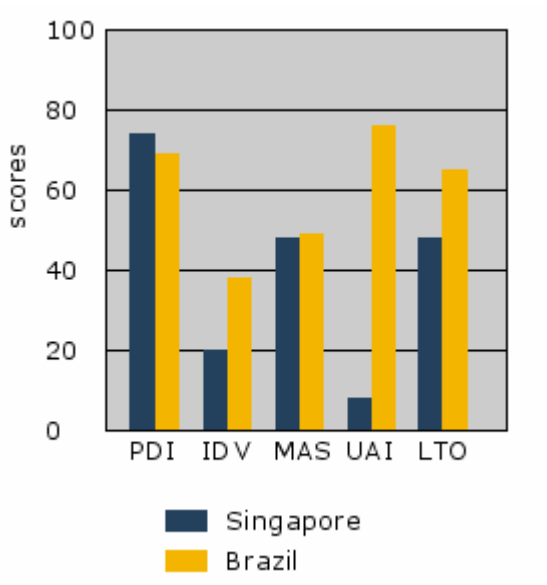
this society, particularly for an "outsider". A Low Long-Term Orientation ranking indicates the country does not reinforce the concept of long-term, traditional orientation. In this culture, change can occur more rapidly as long-term traditions and commitments do not become impediments to change.

Singapore – United States (US)



Power distance in Singapore resides more on the government then its people as compared to US. US emphasize more on individuality whereas Singapore focus more on close-ties between individuals. This goes to show that team work may perform better in Singapore. Both male and female have about equal footing for both countries. Therefore, it would not pose a problem for both countries if a male employee has to report to a female employee. US is unable to deal with uncertainty, which may cause a problem if it has to deal with Singaporean. Singapore is also more long-term focused than the US.

Singapore – Brazil



Singapore and Brazil are about equal in both power distance and masculinity. Singaporeans are more collectivist in nature whereas Brazilians are more individualistic. But the gap is not too great and both countries may find ways of bridging the gap. But the uncertainty avoidance index may cause a problem. Singapore is able to tolerate a high level of uncertainty and ambiguity but Brazil with a high scoring on UAI has a lower tolerance level. In order for Singaporeans to work with Brazilians, it may need to rely on more communication to reduce the ambiguity. Both countries are long-term focused.

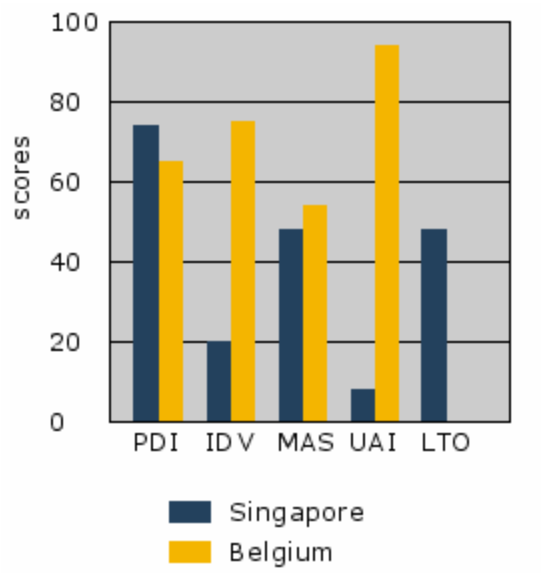
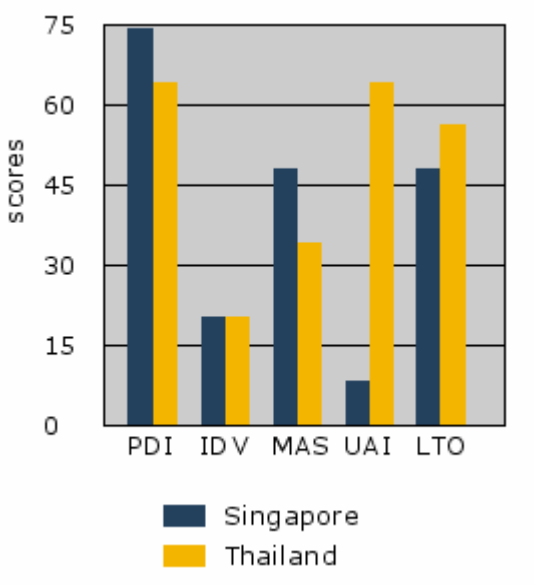
Singapore – Belgium	Singapore – Thailand
	
Singapore and Belgium are about equal in the power distance and masculinity index. But both countries need to work out the differences in individualism and uncertainty. Belgium have extremely low (graph here shows nil) long-term vision. For Belgium to work with Singapore, it needs to show its commitment up-front.	Singapore and Thailand have equal score on the Individualism index. Both countries must pay attention to the uncertainty avoidance index. Gender differentiation is slightly higher in Singapore then Thailand. Therefore, it may be easier for Singapore female to work with their male counterparts in Thailand. Both countries are long-term focused.

Figure 33: Comparison between Singapore with other countries
Source: The 5 models of Professor Geert Hofstede, www.geert-hofstede.com, 2006

In Figure 33, Singapore is used as a pivot point to compare it with other countries. As the research above was divided into three time zones notably America, Europe/Middle East and Asia Pacific, Singapore is compared to a randomly selected country that falls within the three time zones. The United States and Brazil were selected as the comparison for America, Belgium for the European countries and Thailand for Asia

Pacific. Apart from that, Singapore is also compared with Thailand. This is to show that even though both Singapore and Thailand are part of the Asia Pacific region, differences in culture exists.

Although the five models index is useful, it must be approached with caution, as with all kinds of management measurement. The results may show how an average person rate against the five measurements. Not everyone who works with EM is atypical person. For example, a person may be born in Singapore, brought up in China, obtained tertiary education in Britain and decided to settle down in the United States. It is an extreme example but not impossible with the globe-trotting employees of this decade.

GlobeSmart

Noting such cultural concerns, EM has embarked on an expedition if not to eradicate but at least to minimize the cultural impact. EM with its affiliated companies conducts business in more than 200 countries and territories on six continents. Acquiring cultural knowledge and understanding them has becoming more and more important, especially in this globalised environment. Therefore, EM has selected GlobeSmart, which is a web-based cultural tool that provides quick and easy access to extensive information on how to conduct business effectively around the world. There is also a *self-assessment profile* (including demographics and survey) which is essentially a quick "gap analysis" tool towards an employee's personal style which may or may not be similar from the target culture they are exploring. It is used to raise sensitivity to intercultural issues. GlobeSmart is available on the internet, so that any employees would be able to access it from the four corners of the world irregardless of the time zone.

		Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree	Not Applicable
1	When other team members express a set of priorities that are different from mine, I should compromise my own wishes and act in unison with them.	○	○	○	○	○	◉	○	○
2	I feel a strong sense of loyalty towards others in my organization.	○	○	○	○	○	○	◉	○
3	I believe that seniority should be taken into account along with achievement when distributing awards, benefits, or recognition.	○	○	○	○	○	○	◉	○
4	I believe that the entire team should share the blame even if one individual is responsible for the team not meeting its goals.	○	◉	○	○	○	○	○	○
5	I must be prepared to sacrifice my personal goals in order to achieve the goals of the team as a whole.	○	○	○	○	○	◉	○	○
6	I try to display proper manners and etiquette towards other members of my organization regardless of how I really feel.	○	○	○	○	○	○	◉	○

Figure 34: A snat-shot of the survey

Source: GlobeSmart, http://www.globesmart.com/self_assessment.cfm?

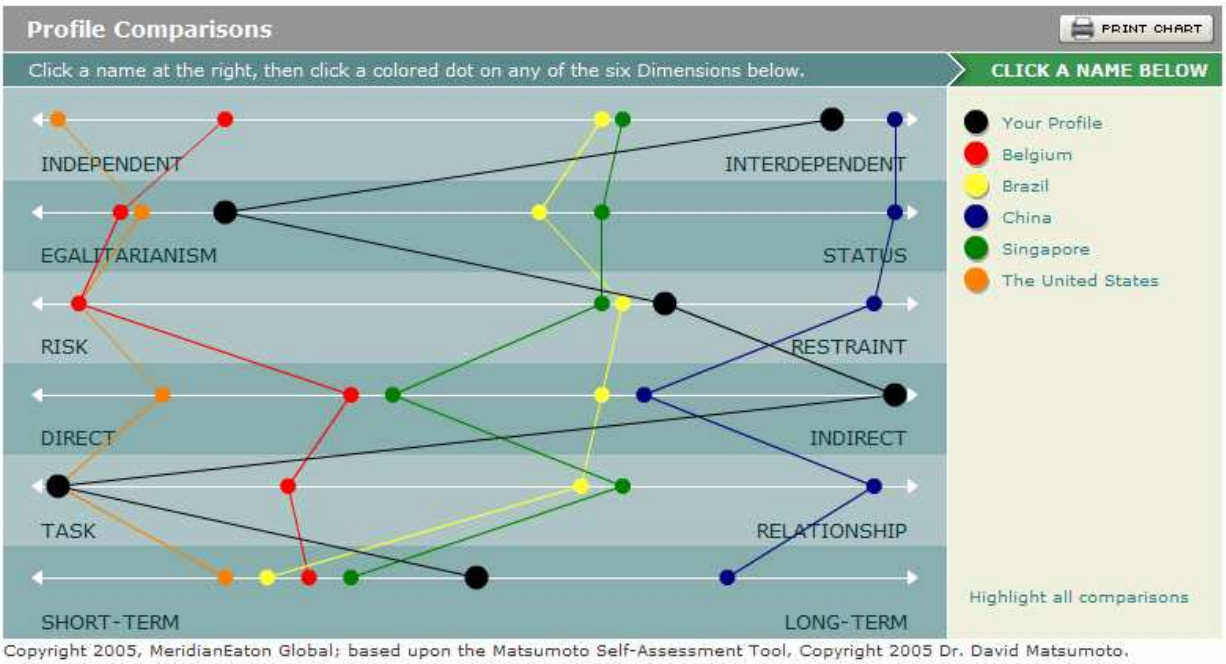


Figure 35: Profile comparison

Source: GlobeSmart,

http://www.globesmart.com/self_assessment.cfm?section=chart#Chart

In 1999, GlobeSmart was originally created for ten countries by MeridianEaton Global[23]. As it gained popularity, GlobeSmart began to evolve and grow through an extensive, on-going process of research, interviews, updates and reviews. Over the years, countless people over 40 countries have enhanced the GlobeSmart content with their insights and advice. The scores are derived from statistical averages from all available country data on the six cultural dimensions existed in research literature. The GlobeSmart Assessment Profile (GAP) was updated in June 2004 to reflect new research that has been conducted in the field. It is a highly reliable research instrument developed by leading cross-cultural researcher, Dr. David Matsumoto of San Francisco State University, and four leading cross-cultural researchers: Hofstede, Schwartz, McCrae and Inglehart (GlobeSmart FAQ, 2006).

[23]Meridian Resources was founded in 1990 and is headquartered in San Francisco. It also have offices or affiliates in Asia, Europe, Latin America, and throughout the United States. Its mission is to develop global citizens and its primary focus is helping clients gain sustained competitive advantage by building and leveraging their global resources.

Figure 36: The Iceberg
Source: GlobeSmart, 2006

GlobeSmart makes use of the Iceberg model (see Figure 36) to describe the hidden (not visible – 80%) values that can be found across cultures. The content describes values and behaviours that are typically found among business people in different countries. We can also use the iceberg model to illustrate explicit and tacit knowledge. The tip of the iceberg (visible area) can represent explicit knowledge which points to documentation, procedures, processes or databases. The hidden portion points to tacit knowledge which encompasses knowledge that are not or difficult to be documented, unshared knowledge or know-how.

GlobeSmart will not apply to every individual in every situation (see Figure 37 on stereotyping). In all cultures, an individual's values, expectations and behaviors will vary according to his/her background, experiences, education, ethnicity, gender, age,

amount of contact with other cultures and a number of other variables that form an individual's life experience.

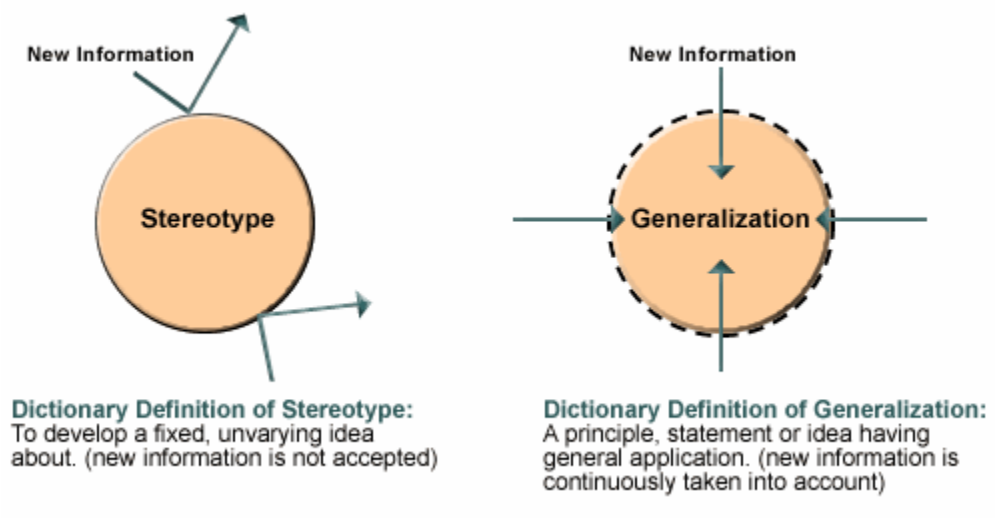


Figure 37: A note about Stereotypes
Source: Globesmart, 9 May, 2006.

The tool is used to understand the differences in cultures, to improve business results through better communication, collaboration and cooperation across cultures, geographies and time zones. The information is continuously reviewed by individuals from the countries and cultures as described above.

As with any types of tools, we must also be wary that the source is not absolute. As in all cultures, people's behaviours will vary accordingly to the background, experiences, education, ethnicity, gender, age, amount of contact with other cultures plus a number of other variables. Therefore, the content can be used for general purposes and not to promote stereotypes. GlobeSmart is not used to replace intercultural training but use it as a reference and awareness-building tool.

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